

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 2/13/97	3. REPORT TYPE AND DATES COVERED Final Technical: 9/30/93 - 9/29/96	
4. TITLE AND SUBTITLE  Final Technical Report			5. FUNDING NUMBERS  F49620-93-1-0593	
6. AUTHOR(S)  Susan L. Sherwood			AFOSR-TR-96 97	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) MIT Japan Program 292 Main Street, E38-700 Cambridge, MA 02139				
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) AFOSR/PKC 110 Duncan Avenue, Suite B115 Bolling AFB Washington, DC 20332-0001			10. SPONSORING / MONITORING AGENCY REPORT NUMBER  19970228 082	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT  Unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words)  The MIT Japan Program was established in 1981 to train American scientists, engineers, and industrial managers about Japan and to promote closer ties between them and their Japanese counterparts. In 1991 the Program became one of the first four United States-Japan Industry and Technology Management Training (JITMT) Centers in the country. This grant was renewed in 1993. In this capacity the Program has been an inspiration for similar initiatives at other universities around the country. Within MIT the Program has also been a model for the recently established MIT International Science and Technology Initiative which is targeting the Pacific Rim and Germany. Today the Program is the largest, most comprehensive and most widely copied center of applied Japanese studies in the country. Located at MIT it is uniquely positioned to utilize the Institute's extensive resources on Japan and East Asia, resources that include faculty, researchers and library collections. The Program pursues its goals through three sets of coordinated activities: education, research and outreach.				
14. SUBJECT TERMS  Japan, science, engineering, management, education, research outreach			15. NUMBER OF PAGES 60	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT	

Massachusetts Institute of Technology  
Center for International Studies  
MIT Japan Program  
Final Technical Report  
For the Period: September 30, 1993 - September 29, 1996  
Grant Number F49620-93-1-0593  
Air Force Office of Scientific Research

**DTIC QUALITY INSPECTED 3**

## Table of Contents

Year One: September 30, 1993 - September 29, 1994.....	3
Year Two: September 30, 1994 - September 29, 1995.....	18
Year Three: September 30, 1995 - September 29, 1996.....	36

## Year One: September 30, 1993 - September 29, 1994

### Summary

This report is being written to inform the Air Force Office of Scientific Research (AFOSR) of the activities of the MIT Japan Program during the year from September 30, 1993 to September 29, 1994 under AFOSR Grant F49620-93-1-0593.

The initial AFOSR grant designated the MIT Japan Program as one of the first four United States-Japan Industry and Technology Management Training (JIMT) Centers in the country. The Program is also the largest, most comprehensive, and most widely copied program of applied Japanese studies in the world. Founded in 1981, the Program seeks to create a new generation of "Japan-aware professionals," who are not only technologically sophisticated, but who can also read, write, and speak Japanese and who are knowledgeable about Japan's social and economic cultures. The Program's vision is to facilitate the flow of information between the United States and Japan, particularly on scientific, technological, and management issues, through these young people.

In order to achieve this, the Program oversees the training of MIT students specializing in science, engineering, and/or management in Japanese language and culture and then places them as interns in Japanese corporate, government, and academic organizations. To date, the Program has trained and placed more than 350 such young people; during the past five years, on average, 50 interns have been placed annually.

Intellectually, the Program's focus has been to integrate the research methodologies of the social sciences, the humanities, and science and technology to approach issues confronting the United States and Japan in their scientific and technological relations. The Program is also uniquely positioned to take advantage of MIT's extensive network of Japan-related resources, which include faculty, researchers, and library collections. The Program disseminates its expertise on Japanese science and technology and on how that science and technology is managed to its sponsors through its three core activities, namely, *education, research, and public awareness.*

Thanks to the continued support of the AFOSR, during the period under review in this report, the Program has maintained its strength in each of these core activities. This report has been written in direct response to the five goals set forth in the United States-Japan Industry and Management Training Call for Proposal (Special Announcement 93-3) dated May 1993. These goals were: **I)** to increase understanding of Japanese industry and technology management methods for the creative use of science and technology; **II)** to provide U.S. citizen and permanent resident scientists, engineers, managers, and students of these areas with training in the Japanese language and an understanding of Japanese business and social culture; **III)** to provide program participants with opportunities to be directly involved in Japanese scientific research, engineering development, and management activities; **IV)** to provide mechanisms for the participation of scientists, engineers, and managers from the Department of Defense and Department of Energy laboratories; and **V)** to create mechanisms for cooperation and partnerships between U.S. industry, academia, and government to apply and employ the results of this program. Activities in each of the Program's three core activities that address these respective goals will be described in the appropriate section below.

**I. Increasing understanding of Japanese industry and technology management methods  
for the creative use of science and technology**

- **Education**

**The AFOSR Travel Prize and Other Awards**

During the period under review, AFOSR funding allowed the Program to give a travel grant for a visit to Japan to a student in the Political Science Department doing research related to Japan in security, energy, technology policy, trade, intellectual property studies, or a similar field. This award was given to James Chung, a Ph.D. candidate, who is currently researching the national innovation systems of the U.S., Japan, and South Korea to determine the political and institutional factors that lead to successful innovation.

This year's Ayukawa Prize, a one-semester stipend and a travel grant, was won by Naomi Chesler of the Division of Health Sciences and Technology, who is working on the design and analysis of a cardiac assist device powered by skeletal muscle. The Ayukawa Travel Prize was given to John Kuo, also of HST, whose research is focused on neural induction, the embryonic process of forming a vertebrate nervous system from undifferentiated cells. The Ayukawa Prizes are made possible through the generosity of the late Yaichi Ayukawa and his family. The MIT Japan Science and Technology Prize, a travel grant for a visit to Japan funded by the Japan-United States Friendship Commission, was awarded to Anil Chakravarthy of the MIT Media Laboratory, who is working on the development of novel computational techniques for information access.

- **Research**

**"Rich Nation, Strong Army" National Security and the Technological Transformation of Japan**

Cornell University Press announced the publication of this book by Professor Richard J. Samuels, Chair of the MIT Political Science Department and Director of the MIT Japan Program, during the period under review.

In this work, Professor Samuels contends that Japan has focused on acquiring, diffusing, and nurturing an autonomous technological capability to achieve security in what it perceives to be a highly threatening world. He examines how Japan has embedded its defense industrial and technology base in its commercial industrial and technology base, not just to enhance its standard of living, but also to reduce its vulnerability to interruption or manipulation of access to foreign technology.

The title of the book refers to a rallying cry that dates to the 19th-century Meiji Restoration. Facing an insecure future in a world presumed to be hostile, Japan's leaders engineered a catch-up mobilization of resources that led to the nation's calamitous defeat in World War II. After that, Samuels contends, Japan's leaders simply shifted course.

In a review of the book, *Kirkus Review* says that Professor Samuels' assessment of the "three-part policy that made technology an indigenous part of the national culture" presents a "genuinely fresh framework in which to evaluate the challenges a Pacific Rim colossus poses for the West."

During his research for this book, Professor Samuels was supported by the Fulbright Foundation and the National Science Foundation. A copy of this book is enclosed. A total of 1,350 copies have been sold.

**Does Ownership Matter? Japanese Multinationals in Europe**

The period under review also saw the publication of this book, edited by Mark Mason and Program Research Associate Dennis Encarnation, by Oxford University Press. In this book, prominent scholars from Europe, Japan, and the United States analyze the causes and consequences of the investment flows that contributed to the dramatic rise of Japanese foreign investment in Europe in the 1980s. These scholars also examine the factors, such as market access, industry- and firm-specific characteristics, and technology transfers, that have shaped these investment flows. The book begins with a broad overview of recent historical trends and then focuses on three strategic industries--financial services, electronics, and automobiles. Drs. Encarnation and Mason were supported by the Euro-Asia Centre of the European Institute of Business Administration (INSEAD) in their work on this book.

### **An Emerging Yen Bloc? A Study of National Governments and Multinational Corporations in East Asia**

This study, also supported by the AFOSR and under the direction of Dr. Encarnation, extends our understanding of the bilateral rivalry between Japan and the United States to include the emerging economies of East Asia. That rivalry is now threatening to become a multilateral contest waged increasingly through foreign direct investment. As a result of these investments, East Asia may emerge as a novel arena for the two countries to play out their rivalry, with multinationals providing increasing shares of that region's trade with both America and Japan. This research project is designed to answer the following questions: Is regional integration actually on the rise in East Asia? If so, what practical role in this dynamic process does Japan play? Specifically, do intraregional patterns of trade and investment portend the eventual emergence of an effective "yen bloc" in East Asia? If so, with what implications?

During the period under review, the following specific research topics have been identified: 1) yen bloc: myth vs. reality; 2) the East Asian difference: beyond nation states, beyond treaties, beyond trade; 3) transnational actors: the private management of East Asian integration; 4) subnational governments: the economic and political geography (and geometry); and 5) implications, to include: a) emerging commonalities within East Asia; b) persistent differences within East Asia; and c) potential tensions between East Asia and NAFTA and EC. Also during the period under review, the planning for and organization of a workshop on multinationals and East Asian integration, scheduled to be held in November 1994, were undertaken.

The AFOSR supported Dr. Encarnation's research assistant on this project during the period under review.

### **Global Manufacturing Equipment Development and Sourcing Project**

Under the direction of Professor Charles H. Fine of the MIT Sloan School of Management, this project is an international, cross-industry study of manufacturing equipment development and sourcing. At present, the scope of the project includes equipment for semiconductor device fabrication and automotive machine tools. A research area common to both industries is the study of critical process technologies for manufacturing.

Lithography, in particular, is a critical process technology for semiconductor manufacturing as next generation device designs depend upon the evolution of lithographic technology to pattern narrower line widths. During the period under review, interviews have been conducted with corporations, universities, and government organizations in the United States, Japan, and South Korea to ascertain international trends in the integration of lithography technology into semiconductor manufacturing. The goal of this phase of the project, to be completed by September 1995, is to integrate an international database, identify effective strategies, and make recommendations for improving the non-proprietary

process of equipment development and sourcing shared by the semiconductor manufacturing industry in the U.S., Japan, and South Korea.

The AFOSR supported Dr. Fine's research assistant during the period under review.

### **Working Papers**

The results of the Program's various research projects are routinely distributed to its sponsors by means of its Working Paper Series. The following working papers were published during the period under review:

*Bringing East Asia Into the U.S.-Japan Rivalry: The Regional Evolution of American and Japanese Multinationals*, by Dennis Encarnation (MITJP 93-39)

*The Japanese Defense Industry's Views of U.S.-Japan Defense Technology Collaboration: Findings of the MIT Japan Program Survey*, by Michael Green (MITJP 94-01)

*R&D Consortia--Contrasting U.S. and Japanese Strengths*, by Gerald Hane (MITJP 94-02)

*U.S. Industry and Government Views on Defense Technology Cooperation With Japan: Findings of the MIT Japan Program Survey: March 1994*, by Matthew Rubiner (MITJP 94-03)

*Beyond the Software Factory: A Comparison of "Classic" and PC Software Developers*, by Stanley A. Smith and Michael A. Cusumano (MITJP 94-04)

*Multi-Product Strategy and Market Growth: The Benefits of Rapid Design Transfer in New Product Development*, by Michael A. Cusumano and Kentaro Nobeoka (MITJP 94-05)

*Multi-Project Strategy, Design Transfer and Project Performance: A Survey of Automobile Development Projects in the U.S. and Japan*, by Michael A. Cusumano and Kentaro Nobeoka (MITJP 94-06)

*U.S.-Japan Defense Technology Cooperation: Ten Guidelines to Make It Work*, by Michael J. Green and Richard J. Samuels (MITJP 94-07)

*Multinationals and Regional Integration: A Comparison of the Americans, Europeans and Japanese in the EC and NAFTA*, by Dennis J. Encarnation (MITJP 94-08)

*The Sound of One Chip Clapping: Yamaha and FM Synthesis*, by Robert Johnstone (MITJP 94-09)

*Subregional Power and Regional Integration: The Case of Tumen River Development*, by Katherine B. Burns (MITJP 94-10)

During the period under review, approximately 1,200 working papers have been disseminated. The working paper series is supported by the Program's corporate consortium. A copy of each of the above papers is enclosed.

### **• Public Awareness**

### **The MIT Japan Program Science, Technology & Management Report**

The ability to manage the technological process increasingly determines the competitiveness of firm and nation alike. Despite some notable failures, Japan's success in the management of the technological process presents a formidable model as well as a challenge for its competitors. This Report offers an up-to-date view of this management process and its relationship to economic competitiveness. Additionally, by examining joint ventures, research consortia, trade and business associations, ministry- and agency-sponsored research activities, and private R&D linkages, the Report provides corporate strategists and public policy makers with a critical view of the dynamic relationship between technology and the marketplace.

The first three issues of this Report came out during the period under review. Each issue of the Report examines the research and development of a key technology in Japan and focuses on the particular industry relevant to that technology. There is an emphasis on the corporate, industrial, and government linkages that advance Japanese capabilities in the field. The issues published during the period under review covered technology and Japan's multimedia industry, Japan's environmental industry, and Japan's micro machine industry, respectively.

A unique set of resources meets in this publication. Based in Japan, the Report has direct access to Japanese corporate and government R&D centers, ministries and agencies, corporate strategists, and market data. The Program's Tokyo Officer, E. Keith Henry, who is the chief contributing editor, has extensive experience advising Fortune 500 firms in Japan and the rest of Asia as a consultant with one of the world's largest management consulting companies. Other contributors include professionals with first-hand experience in such fields as engineering, political science, and journalism. In addition, MIT-sponsored research provides insights into Japanese R&D trends and issues.

A total of 9,000 copies of the report have been mailed out. A copy of each of the three issues of the Report is enclosed.

The Report is fully funded by the AFOSR.

#### **Japanese Language Scientific and Technical Information Project**

In cooperation with the MIT Libraries, the Program is creating a national resource for Japanese scientific and technical information, serving universities, industry, and government, with a focus on the practitioner rather than the scholar. Some of the most important research in many technical fields is being carried out in Japan, resulting in a publication explosion as well as the proliferation of unpublished research results. While the telecommunications transformation has provided increased potential for access to this information, there is an urgent need to identify sources and to organize and facilitate this access. MIT, with its long tradition of cooperation with researchers and scholars in Japan, is an appropriate site for such a national resource. The project will build on several existing strengths of the MIT Libraries: 1) strong collections in the sciences and engineering, including approximately 200 journals and 1,000 technical reports related specifically to Japanese science and technology; 2) strong collections in economics, political science, and management; 3) a user service orientation, demonstrated by such projects as a substantive Information Services Study carried out in 1992 and advanced network connectivity through MITnet and Athena, MIT's campus-wide academic and computing facility.

In conjunction with the Libraries, the Program asked for, and received from the AFOSR, funding for the first stage of this project, during which an electronic guide to a wide range of information resources and services on science and technology in Japan is to be developed and made available to universities, government agencies, and companies via the Internet. The AFOSR is providing salaries for one full-time information specialist for 18 months and for one half-time technical specialist for 12 months, in addition to funding for operating expenses for this project.

During the first half of the period under review, the job posting for the information specialist, the "content" person for the project, was developed and posted to appropriate media reaching individuals with the qualifications required. One exceptionally qualified candidate emerged from this search. Unfortunately, he accepted another position immediately before coming to MIT to interview. In the second half of the period under review, the search was reopened and reposted. Personal contacts were made in this recruitment process with other JIMT centers. In addition, Rae Jean Wiggins, the MIT Libraries coordinator for this project, undertook recruitment activities at the Fourth Annual NTIS/JICST Conference on Locating and Acquiring Japanese Scientific and Technical



Information held July 14-15 in Boston. This resulted in a viable pool of applicants; interviews were scheduled and references on candidates requested. (Although not during the period under review, a specialist was hired in October 1994 and began work on the project on November 1.)

The NTIS/JICST Conference also afforded Ms. Wiggins to continue earlier discussions with other JIMT centers on potential collaborative ventures. In addition to providing Ms. Wiggins valuable in-person networking time, the conference itself contributed to her own knowledge of the content piece of this project. This background will be invaluable in her future coordination efforts.

#### **Meeting on Organizational Learning in the U.S. and Japan: Tapping the Power of Adaptive Change**

Japan's leading position in the manufacturing quality arena has been attributed to the application of methods such as just-in-time and quality control circles. In the 1980s, U.S. organizations sought to improve productivity by adapting these techniques wholesale, in some cases spending millions of dollars and failing to make long-term improvements. Now in the 1990s, leading organizations in both the U.S. and Japan have realized that, in an era of rapid change and global influence, an organization-wide learning strategy based on flexibility and adaptability is the key to long-term competitiveness.

The goal of this important meeting, held during the period under review, was to present models of how organizations in the U.S. and Japan are able to link quality, product development, and management with continuous learning throughout the organization. Using Japan's traditional strength in organizational learning as the background, this meeting focused on current cases of successful learning approaches in the U.S. and Japan.

This meeting was created, planned and organized by the Program's Director of Training, who is supported by the AFOSR. It was co-sponsored by the Program and the JIMT centers at the University of California at Berkeley and Stanford University and was attended by 85 individuals, 50 from industry, 20 from government, and 15 from academia.

#### **Meeting on Partnering With Japan**

This meeting was held during the period under review and was fully funded by the AFOSR. It was attended by 70 participants, 45 from industry, 15 from government, and 10 from academia.

The framework of this meeting involved presenting successful models for partnering with Japan that yield not only short-term monetary or Japan-market-access advantages, but that are integrated into a company's long-term learning and technology strategies. Michael Gerlach of UC Berkeley presented a general overview of partnering with Japan and how U.S. partners have fared, including statistics about past and current activity (i.e., how many joint ventures there are in Japan and how long they last; distributor relationships; joint R&D projects). The remainder of the meeting consisted of three panels, each focused on a specific industry: 1) aerospace, in which the U.S. holds a technological lead; 2) autos, where the U.S. is still behind; and 3) semiconductors, where there is a balance of power between the U.S. and Japan. These panels looked at the learning strategies, financial structures, and licensing activities in these organizations. The goal of the meeting was to present alternative ways to cooperate with Japan that maximize benefit to the U.S. partner.

#### **Intellectual Access in Japan: Planning Workshop**

The field of Japanese studies has been politicized in the past decade. Japan scholars, particularly social scientists, have been criticized by some in the United States for being excessively critical of Japan. Still other have been accused of not being critical enough. This debate has been characterized by name calling, ad hominem attacks, and defensiveness

on all sides. It is as unlikely that this debate will be easily solved as it is likely that the mistrust and acrimony will become ever more consequential for U.S.-Japan relations.

Nonetheless, scholarly research has become central to the economic, political, and technological relationship between the United States and Japan. Interpretations of trade and investment data, analyses of markets, and characterizations of the U.S. and Japanese systems now inform policy choices very directly. Scholars, in particular social scientists, therefore, have become "public intellectuals" whose views are routinely sought by policy makers.

The purpose of this workshop, held May 12-13, was to ask--and attempt to answer--some questions about how the Japanese provide and/or restrict intellectual access for foreign researchers. Approximately a dozen scholars and selected journalists attended the workshop. Short papers, three to five pages in length, were presented; some of the questions they addressed included:

1. What are the necessary conditions for intellectual access in Japan (e.g., language skills, networks, affiliations)?
2. What are the sufficient conditions (e.g., non-threatening research, close personal ties, etc.)?
3. What obstructs and what facilitates intellectual access in Japan?
4. What do Japanese host institutions expect of affiliated researchers?
5. Is there reciprocity in scholarly exchange and access?
6. Do Japanese elites treat foreign scholars more generously than they treat Japanese scholars?
7. Does the Japanese tenure system affect scholarly inquiry?

The funding for this meeting was provided by the Japan-United States Friendship Commission.

### **The Japan Database Project**

Under this project, also fully funded by the AFOSR, the Program has, during the period under review, developed and put in place three databases: 1) *The Japan-Aware Professionals Database*, which tracks the training, placement, and career development of Program interns; 2) *The Japan Science and Technology Experts Database*, which contains information concerning American scientists, engineers, and other professionals with knowledge of specific areas of scientific and technological R&D in Japan; and 3) *The Japan Trip Report Database*, which contains reports on scientific and technological developments in Japan from MIT faculty doing research there. The second of these databases was obtained with the cooperation of the Japan-United States Friendship Commission and has been put on the World Wide Web (WWW) by MCC, so that it is available to the other JIMT centers.

### **Dinner Series**

The Program's dinner series, which is supported by the Ayukawa Fund and the Program's corporate consortium, provides a forum for top-level Japanese and American policy makers, business people, academics and the general public to engage in the dialogue that is essential for smooth U.S.-Japan relations. Seminars held prior to the dinners examine the latest scientific and technical developments in Japan. Dinner speakers and topics during the period under review have been:

*Individual and Organizational Learning: U.S. and Japanese Experiences*, by Robert Cole, Professor of Sociology and Business Administration, University of California at Berkeley, October 6, 1993.

*Competing Visions of 'Fairness' in Japan and America: Implications for Strategy*, by Frank Upham, Professor of Law, Boston College Law School, December 14, 1993.

*Looking at the Sun: The Rise of Japan and East Asia as an Economic and Political Power*, by James Fallows, Author/Washington Editor, Atlantic Monthly, March 17, 1994.

### **Technology Forum Lectures**

Our Technology Forum Lectures, given several times each semester, are free and open to the public. The goal is to disseminate research findings related to Japan and/or observations made during visits to Japan. During the period under review, the following Technology Forum Lectures were presented:

*Competing With Japan and Asia: The Challenge to U.S. Firms*, by Kathleen Molony, 1993-94 Associate, Program on U.S.-Japan Relations, Harvard University, January 11, 1994.

*Defense Technology Conversion and Dual-Use Procurement Competition in East Asia*, by Clark Abt, Director, Defense Technology Conversion Center, Boston University, February 16, 1994.

*Global Competitiveness and Strategic Alliance in High Technology Industries Between the USA and Japan*, by Tsuneo Nakahara, Vice Chairman, Sumitomo Electric Industries, Ltd., March 2, 1994.

*Current Changes in Japan and Their Impact on Japan-U.S. Relations*, by the Honorable Toshio Mochizuki, The Consul General of Japan, Boston, April 7, 1994.

*"Negotiating With the Japanese": CD-ROM Video Presentation*, by Patricia Gercik, Managing Director, MIT Japan Program, September 22, 1994.

These lectures are supported by the Program's corporate consortium.

### **Seminars and Informal Talks**

The Program also periodically hosts seminars and informal talks, funded by its corporate consortium, as part of its public awareness outreach. During the period under review, the following seminars were held:

*Agents of Nonviolence: Police, Military, Normative Structures and Japanese Security*, with Peter Katzenstein, The Walter S. Carpenter, Jr., Professor of International Studies, Cornell University, December 7, 1993.

*A Limited Nuclear-Free Zone for Northeast Asia*, with John Endicott, Professor of International Affairs and Director of the Center for International Strategy, Technology, and Policy, Georgia Institute of Technology, March 21, 1994.

Also during the period under review, the Program sponsored one informal talk, *Consumer Culture and the Creation of Adolescence in Japan*, by Merry White, Department of Sociology, Boston University, on November 4, 1993. This talk was supported by the Program's corporate consortium and co-sponsored by the Cultural Studies Project at MIT.

Both the seminars and the talk were free and open to the public. These events are supported by the Program's corporate consortium.

## **II. Providing U.S. citizen and permanent resident scientists, engineers, managers and students of these areas training in the Japan language and understanding of Japanese business and social culture**

### **• Education**

Education is central to the Program's activities. Program interns, who will be described in Section III below, must have at least two years of Japanese language training before they go to Japan. In order to provide that training, the Program works closely with and provides some financial support to the Japanese Language and Culture Program at MIT, which is under the direction of Professor Shigeru Miyagawa of the Department of Foreign Languages and Literatures.

The MIT Japanese-language teaching team is one of the best in the country. Professor Miyagawa has taught Japanese for 20 years and is regarded as one of the world's top Japanese linguists. Other members of the team are: Assistant Professor Takako Aikawa, one of the most outstanding young Japanese linguists in the U.S.; Lecturer Tomoko Graham, an expert in the use of computer networking in Japanese instruction; Lecturer Masami Ikeda, who was one of the most sought-after young instructors of Japanese in the U.S. when MIT hired her last year; and Lecturer Yoshimi Nagaya, a Cornell graduate who is also considered one of the top young teachers of Japanese in this country. During the period under review, AFOSR support has allowed the Program to sponsor an increased number of Japanese language classes during the academic year and to provide supplemental tutoring for its interns.

#### **Regular Academic-Year Language Classes**

During the period under review, the AFOSR has provided partial funding for two Japanese language lecturers in the Institute's Department of Foreign Languages and Literatures. This has made it possible for the Department to continue to offer three full years of Japanese. Japanese was first offered at MIT in the spring of 1988. Since that time, the Program has worked closely with the Department to develop and expand the Japanese language curriculum at the Institute. Today, with support from the AFOSR, there are 13 Japanese classes being given at MIT; seven are first-year sections, four are second-year, and two are third-year. With a total enrollment of 246 students, Japanese is the most commonly taught foreign language at the Institute.

#### **Summer Language Classes**

Some Program interns complete the first of the two required years of Japanese language during regular academic classes and need to finish their second year during the summer to prepare for an autumn departure. For such students, the Program offers intensive second-year Japanese during the summer. This year, six students benefited from this initiative, which was fully supported by the AFOSR.

#### **Tutoring for Program Interns**

Some Program interns find that, due to scheduling and other conflicts, it is not possible for them to complete the required two years of Japanese language training in regular academic classes. Others may need supplemental tutoring outside of the classroom. In such cases, the Program provides tutoring. During the period under review, the AFOSR has supported six interns under this Program initiative.

#### **Curriculum Development**

In light of the need for rapid Japan-related training for corporate and government sponsors who deal with Japan on a continuing basis, the Program has created, during the period under review, a new course format called Japan Effectiveness Training (JET), which was held June 6-10, 1994. In a concentrated format of five days, JET seeks to immerse the participants in the "core values" of Japanese culture and to provide the participants with the confidence they will need in interpreting the subtexts of this well-networked society.

JET is a multi-media approach to learning about Japan. The course contains lecture modules (e.g., "The Supplier Network in Japan," "The Future of the Japanese Economy," and "Lean Manufacturing and the Toyota Method"), self-study with the *On Track With the Japanese* CD-ROM by Program Managing Director Patricia Gercik, hands-on training in traditional Japanese arts (calligraphy, Zen meditation), video segments, readings, outreach to academic and cultural experts, simulations and role-play scenarios, and creation of Japanese environments, such as a representation of a Japanese temple meditation hall. By combining these various approaches and methods in an intensive course, the students gain experience in applying ideas to actual situations, a key to success in a foreign country.

JET this year was attended by 21 participants; 16 were from industry, 3 from academia, and 2 from government. The course is self-supporting through tuition paid by the participants.

### **U.S.-Japan Industry and Technology Management Training Program**

Last year, the Program was chosen by the Department of Commerce to be one of the two centers to provide instruction to the first group of manufacturing engineers to go to Japan under the U.S.-Japan Industry and Technology Management Training Program. This initiative was jointly announced in 1992 by then-Vice President Quayle and the Minister of MITI, Kozo Watanabe. The goal of the program is to provide opportunities for U.S. manufacturing engineers to work in Japanese companies for 12 months.

During the nine-week period from October 12 to December 10, 1993, the Program provided instruction in Japanese language and in Japanese business and social culture to a group of 11 of these engineers from such major U.S. corporations as Ford Motor Company, General Motors, Motorola, Xerox, and AT&T. These engineers departed for Japan in January 1994. There, after an additional month of training provided by the Japan External Trade Organization (JETRO), they were placed on the manufacturing floors of top-ranking Japanese manufacturing companies. The MIT portion of their training was supported by the Department of Commerce.

### **Japan Target Seminars**

During the period under review, the Program offered nine Japan Target Seminars in order to disseminate its knowledge of Japanese science, culture, and business to technologically sophisticated professionals in U.S. corporate and government organizations. These seminars consist of a series of tailored modules that can be combined, according to need, for one- or two-day sessions taken on-site by Program staff or, if more convenient, given at MIT. During the 12 months covered by this report, two target seminars were given at Ford, one at IBM, one at Kodak, one at MICOM, one at NASA, one at Trimble Navigation, and two at United Technologies. The Japan Target Seminars are supported by the AFOSR. The total number of participants was 525.

In keeping with the Program's goal of utilizing new technology for learning, the UTC seminars are offered via video teleconferencing to multiple sites, and the IBM seminars are broadcast to multiple sites via satellite.

### **MIT Japan Program Video Series**

The period under review also saw the development of the Program's Video Series, created as part of our effort to create Japan awareness at all levels of leading U.S. organizations in a way that will accommodate both time and budget constraints. The video series, originally released in November 1993, is a collection of lectures, seminars, and symposia concerning critical issues related to Japan. Ranging from successful negotiation practices to manufacturing methods, the series seeks to disseminate vital information about

Japan from the Program's base of in-depth Japanese knowledge. It includes presentations by MIT faculty, Program staff, and research associates. It also contains the proceedings of several symposia sponsored by the Program and attended by knowledgeable individuals from the government, corporate, and academic sectors.

Current titles in the series are:

*An Examination of the Historical and Cultural Antecedents of Modern Japanese Business Practices*  
*Corporate Organization in Japan*  
*Negotiating With the Japanese*  
*The Globalization of Japanese Technology*  
*Recent Trends in Japanese Manufacturing and Development*  
*An Overview of Japanese Science and Technology Today*  
*Political Economy of Japan: Parts I and II*  
*Who Is the Japanese Bureaucrat?*  
*Partnering for Competitive Control: Strategic Relationships in Japan*  
*The Americanization of the Japanese Economy: Prospects and Protests*  
*The Japanization of American Manufacturing: What's Really Happened*  
*The Internationalization of Japanese R&D*  
*The Meltdown of Japan's Iron Triangle: Implications for the U.S.*  
*Technology Transfer with Japan: Obstacles and Opportunities*  
*Competing Visions of Fairness in Law and Legal Norms in Japanese and U.S. Society: Implications for Strategy*  
*Looking at the Sun*  
*Building Learning Organizations*  
*Overview of Organizational Learning in Japan*  
*Organizational Learning in the U.S. and Japan*  
*Learning Across Organizations: Creating the New American TQM*  
*The Role of Learning in Technological Innovation*  
*The Role of Learning in Product Development*

The Video Series has been made possible by support from the AFOSR. During the period under review, the Program has distributed more than 340 tapes. With an estimated audience of 30 persons per tape, the tapes have been disseminated to approximately 10,000 people. A brochure describing the series and two sample videos are enclosed.

#### **On Track With the Japanese: A Step-by-Step Approach to Building Successful Relationships—the CD-ROM Project**

This project, which utilizes one of the cases in Program Managing Director Patricia Gercik's book *On Track With the Japanese*, was completed during the period under review. The interactive game that has been created from the case study requires specific decisions from the player at each stage of the negotiation process, teaches the rules of Japanese business practices, differentiates between important and incidental rules, replays each episode to illustrate the Japanese reaction, and relates the entire episode to Japanese core values. Each stage concludes with a summary that scores or evaluates the player's performance from the standpoint of: 1) the individual Japanese response; 2) Japan's culture and values; and 3) effectiveness in terms of reaching the U.S. company's goals. This project was fully supported by the AFOSR.

### **III. Providing program participants with opportunities to be directly involved in Japanese scientific research, engineering development, and management activities**

- **Education**

## **Internships**

The placement of MIT students in the fields of science, technology, and management as interns in Japanese corporate, government, and academic organization remains the primary focus of the Program's educational activities. As a new generation of Japan-aware professionals, the interns are the most valuable resource that the Program makes available to its corporate and government sponsors and indeed the nation. The Program's first interns were placed in Japan in academic 1983. Since then, this aspect of the Program has shown continued strength. During academic 1993-94, a total of 53 interns were placed in Japanese organizations; in academic 1994-95, the corresponding number is 52.

With their training in Japanese language and culture, the interns have the authority to gain access to Japanese and scientific information as well as to the inner workings of Japanese organizations. The interns become fully integrated members of their research teams, with the same access to technical and business information as their Japanese colleagues. They routinely read research reports and memoranda in Japanese. By the end of their stay in Japan, they are usually expected to make a professional presentation or write a patent in Japanese.

During late January of this year, a two-day cross-cultural training retreat for interns planning to go to Japan during calendar 1994 was held at the MIT Endicott House, a conference facility in the southwestern suburbs of Boston. This retreat is a unique feature of how the Program prepares its interns for their stay in Japan. A major component of the retreat is the case-study approach, by which students read about the experiences of interns and business people who have gone to Japan before them. Each case ends at a point of impasse, and the group then analyzes the underlying cultural values, assumptions, and beliefs that are causing the behaviors described. Through these case studies, the interns learn about the cross-cultural experiences they can expect to encounter once in Japan. In addition to providing cross-cultural training, the retreat is an opportunity for the interns to create bonds amongst themselves that will be vitally important to them in Japan.

The interns and the intern retreat are supported by the Program's corporate consortium and the Starr Foundation. Once in Japan, the interns are supported by their Japanese host companies.

In July of this year, a one-day workshop "Issues in Japanese Science & Technology Management" was held in Yokohama to bring together JIMT Center interns in Japan. All JIMT Centers participated. Of the total 123 attendees, 52 were MIT Japan Program interns. The goal of the workshop was for the participants to exchange ideas on how to maximize their experiences at their respective research and manufacturing facilities in Japan and to network with one another. This meeting was fully supported by the AFOSR.

## **Summer Internships**

Most of the interns placed by the Program are graduate students who are prepared to stay in Japan for approximately a year and, in some cases, even longer. There is, however, strong interest on the part of undergraduates at the Institute in living and working in Japan for a time. In response to this, the Program has developed a summer internship initiative, which our experience has shown is very effective for these young people. A summer internship does not break up the flow of their studies, they can get to know Japan gradually, and their adjustment process is less problematic. These internships serve as an introduction to Japanese R&D and Japanese science and technology. Since these are short-term placements, many of these interns spend several summers at different companies in Japan, giving them an expanded range of experience, effectiveness, and fluency. Many return to Japan after graduation for a year-long placement with a Japanese company.

Every effort is made to place summer interns with subsidiaries of corporate sponsors. It is our view that this opportunity for early bonding with the sponsor will facilitate later hiring. Summer interns receive a stipend from their host companies; the Program pays for their airfare. Based on the number of these interns who return to Japan for longer stays, the Program feels that summer internships are an important part of its activities. During the summer of 1994, the AFOSR supported 13 summer interns; four additional summer interns were funded by the Starr Foundation.

#### **Tokyo Officer**

Tokyo Officer E. Keith Henry provides a critical information and support function for Program interns in Japan. Approximately one third of his responsibilities relate to intern issues, including outreach to Japanese host companies to develop new placement contacts, coordinating professional and social events for the interns, facilitating communication between the Program and the interns, and problem-solving through advice, counsel, and intercession as needed. The Tokyo Officer is fully funded by the AFOSR.

#### **Managing Director's Trip to Japan**

As another part of the internship support initiative, the Program's Managing Director travels to Japan each spring to meet with the interns and to exchange information with them. During this trip, the Managing Director also meets with current and potential host companies to assess how their needs can best be met through intern placement. This trip is fully supported by the AFOSR.

#### **Technical Japanese Language Project**

MIT continues to be the only institute in the world to offer intensive courses in advanced Japanese reading in targeted technical fields, i.e., computer science and electrical engineering, and materials science and related engineering (to include chemical engineering, mechanical engineering, and physics). These courses are held during an eight-week period in the summer.

During the 12 months under review, the critical work of advertising for these courses and identifying appropriate candidates was undertaken. More than 18,000 brochures were printed and mailed, press releases were sent to publications and journalists around the world, the courses were advertised on electronic mail networks and by word of mouth, and announcements were placed in academic and professional publications. This year, for the first time, extensive promotion was carried out in Japan in an attempt to reach American scientists and engineers studying or working there.

This summer, the technical Japanese language classes were held from June 13 to August 5. In total, there were 14 participants. Technical Japanese for Materials Science and Related Engineering had eight participants; Technical Japanese for Computer Science and Electrical Engineering had six. Currently, more than 100 scientists and engineers have been through one of these courses.

The Technical Japanese Language Project is partially funded by the AFOSR. Some student fellowships are also provided by the Japan-United States Friendship Commission.

### **IV. Providing mechanisms for participation of scientists, engineers, and managers from the Department of Defense and Department of Energy Laboratories**

- ***Education***



### **Intern Recruitment**

During the period under review, the Program's government and corporate sponsors have continued to have access to interactions with Program interns. It is with the support of these sponsors that more than 350 MIT students in science, engineering, and management have been trained and placed in research settings within Japanese corporate, government, and academic organizations. The interns' areas of expertise cover a broad range, including electrical engineering, computer science, mechanical engineering, management, materials science, chemical engineering, biology, mathematics, and architecture.

These interns return to the United States with a keener knowledge of how to get things done in Japan, a set of insights about the Japanese management system and R&D approaches, and a greater sense of how people can work together in groups toward a creative gain. They return as a cadre of world-class engineers, scientists, and managers dedicated to contributing to advancement in their chosen fields and fired by the vision that this advancement rests in part on better interaction with Japan and an active pursuit of technology in the global arena. As such, the interns are the most valuable resource we can offer to our corporate and government sponsors.

In recognition of the importance of the interns, each spring the Program distributes to its sponsors a comprehensive Resume Book of interns who are on the job market. During the period under review, the Resume Book was compiled, prepared, and distributed. This undertaking was supported by the Program's corporate consortium.

### **Training Programs for Government and Corporate Sponsors**

In response to interest from the Program's government and corporate sponsors in studying the Japanese business and social culture, we have developed our Japan Effectiveness Training (JET) course during the period under review. A description of this is included under *Curriculum Development* in Section II above.

#### **• Research**

### **Survey on U.S.-Japan Defense Technology Collaboration**

This project, supported by the AFOSR, was completed during the period under review. The goals of the survey were: 1) to acquire statistical data to improve analysts' understanding of both the qualitative and quantitative aspects of defense-related and dual-use technology collaboration between the United States and Japan; 2) to evaluate the extent to which the United States has benefited from such collaboration; 3) to assess U.S. industry and government attitudes toward such collaboration with Japan; and 4) to assess the bureaucratic and commercial obstacles to collaboration and the strategic framework within which U.S. industry and government pursue collaboration. Two working papers based on this project, *The Japanese Defense Industry's Views of U.S.-Japan Defense Technology Collaboration* by Michael Green, the Program's Washington Research Associate, and *U.S. Industry and Government Views on Defense Technology Cooperation With Japan* by Matthew Rubiner, the Program's Director of Government Relations and Research Seminars, were published during the period under review. These papers were widely circulated to the U.S. defense industry. A copy of each of these papers is enclosed.

#### **• Public Awareness**

### **Workshop on U.S.-Japan Defense Technology Collaboration**

This meeting, an outgrowth of the above-mentioned survey, was held during the period under review in cooperation with the Defense Production Committee of Keidanren

(the Federation of Economic Organizations--Japan's largest business organization). The purpose of the two-day workshop was to bring together experts from U.S. and Japanese industry to discuss the policy implications of the survey's findings. The participants offered frank opinions and explanations regarding the objectives of bilateral defense technology collaboration, the obstacles to expanded collaboration, and possible new approaches to the problem. In view of the political firestorms that have accompanied this issue in the past, there was a remarkable degree of unanimity on why reciprocal technology collaboration is important to both countries and on what would and would not work. A copy of the paper generated by this meeting, *U.S.-Japan Defense Technology Collaboration: Ten Guidelines to Make It Work*, is enclosed.

#### **V. Creating mechanisms for cooperation and partnerships among U.S. industry, academia, and government to apply and employ the results of this program**

- **Education**

##### **Sponsor Training Retreat**

In early 1992, 10 representatives from the Program's sponsor organizations attended the intern cross-cultural training retreat described above. The interest was so strong that the Program decided to create a similar retreat aimed specifically at sponsor personnel.

During the period under review, this event was held November 16-17, 1993 at Endicott House. It was designed to provide an intensive 24-hour look at Japan--a nation that is fiercely competitive in the modern world and yet determined to conduct business in a traditional framework. Fifty-five people participated in the retreat: 29 were from industry, 15 from government, and 11 were the U.S.-Japan Industry and Technology Management Training Fellows then being trained by the Program.

Presentations were made by well-known academics on: negotiating and communicating with the Japanese; Japan's rise to global prominence and the U.S.-Japan alliance; the Americanization of the Japanese economy; the Japanization of American manufacturing; the Japanese R&D diaspora; the meltdown of Japan's iron triangle; technology transfer with Japan: obstacles and opportunities; and U.S. access to critical Japanese technologies. Following the presentations, there was active discussion and exchange of opinions among the academic, corporate, and government attendees.

Full support for this retreat was provided by the AFOSR.

## Year Two: September 30, 1994 - September 29, 1995

### Summary

This report is being written to inform the Air Force Office of Scientific Research (AFOSR) of the activities of the MIT Japan Program during the year from September 30, 1994 to September 29, 1995 under AFOSR Grant F49620-93-1-0593.

The initial AFOSR grant designated the MIT Japan Program as one of the first four United States-Japan Industry and Technology Management Training (JIMT) Centers in the country; this grant was renewed in 1993 for another two years. Today, thanks to AFOSR support, the Program is the largest, most comprehensive, and most widely copied program of applied Japanese studies in the world. Founded in 1981, the Program seeks to create a new generation of "Japan-aware professionals," who are not only technologically sophisticated, but who can also read, write, and speak Japanese and who are knowledgeable about Japan's social and economic cultures. The Program's vision is to facilitate the flow of information between the United States and Japan, particularly on scientific, technological, and management issues, through these young people.

In order to achieve this, the Program oversees the training of MIT students specializing in science, engineering, and/or management in Japanese language and culture and then places them as interns in Japanese corporate, government, and academic organizations. To date, the Program has trained and placed nearly 400 such young people; during the past five years, on average, 50 interns have been placed annually.

Intellectually, the Program's focus has been to integrate the research methodologies of the social sciences, the humanities, and science and technology to approach issues confronting the United States and Japan in their scientific and technological relations. The Program is also uniquely positioned to take advantage of MIT's extensive network of Japan-related resources, which include faculty, researchers, and library collections. The Program disseminates its expertise on Japanese science and technology and on how that science and technology is managed to its sponsors through its three core activities, namely, *education*, *research*, and *outreach*.

Thanks to the continued support of the AFOSR, during the period under review in this report, the Program has maintained its strength in each of these core activities. This report has been written in direct response to the five goals set forth in the United States-Japan Industry and Management Training Call for Proposal (Special Announcement 95-3) dated 17 February 1995. These goals were: **I)** to increase understanding of Japanese industry and technology management methods for the creative use of science and technology; **II)** to provide U.S. citizen and permanent resident scientists, engineers, managers, and students of these areas with training in the Japanese language and an understanding of Japanese business and social culture; **III)** to provide program participants with opportunities to be directly involved in Japanese scientific research, engineering development, and management activities; **IV)** to provide mechanisms for the participation of scientists, engineers, and managers from the Department of Defense and Department of Energy laboratories; and **V)** to create mechanisms for cooperation and partnerships between U.S. industry, academia, and government to apply and employ the results of this program. Activities in each of the Program's three core activities that address these respective goals will be described in the appropriate section below.

**I. Increasing understanding of Japanese industry and technology management  
methods  
for the creative use of science and technology**

- ***Education***

**The MIT Japan Science and Technology Prize**

The MIT Japan Science and Technology Prize, a \$2,500 travel award, is advertised throughout the Institute each spring, helping to raise awareness of and interest in technical and scientific developments in Japan. This year, the prize was awarded to Matthew S. Bogyo from the Institute's Center for Cancer Research. Mr. Bogyo is studying G-proteins. These proteins consist of three subunits, and studies of the process by which these subunits come together may aid in the understanding of how these proteins perform their complicated tasks within the cell. According to Mr. Bogyo, the most significant contribution to the research methodology in this area has been made by Tomiko Asano's group in Japan, which he will visit with his prize stipend. In addition, he says, his lab has generated several reagents, which he plans to give to Dr. Asano to aid in future research projects.

The Prize is funded by the Japan-United States Friendship Commission.

***Research***

In response to the needs and concerns of our sponsors, ascertained through our continuing dialogue with them, the Program has undertaken several important *research* projects during the period under review. We have made a particular effort to recognize the changing priorities of our sponsors as the Pacific Rim region begins to open up and as the sponsors begin to encounter Japanese business structures and practice in the region. Our current research projects are outlined below.

**The Re-emergence of Great Power Politics in East Asia: Is Japan Balancing China?**

This project is evaluating the nature of Japanese foreign policy with regard to China. This understanding will be critical to U.S. government and business in terms of assessing Japan's economic and political strategy for China and the Pacific Rim. The analysis will examine the nature of relations between Japan and China in a number of areas, beginning with patterns of technology transfer and the force structure of the Japanese military, i.e., the equipment and organization of Japan's armed forces as reflected by the roles and missions expected of them. It will also include economic strategies, alliance politics, and diplomatic behavior. The implications of Japanese policy toward China are quite fundamental for the future of Northeast Asia. Understanding Japanese strategy in the region as well as the implications of these strategies on the region as a whole (and on U.S. interests in it) will be important conclusions of the project.

The project has begun with a careful analysis of Japan's strategic setting, i.e., what sorts of power, military or otherwise, are threatening to Japan as an island nation with high levels of trade dependencies and population density, and a lack of natural resources. Thus, the political/strategic geography of Japan in Northeast Asia is to be laid out as a basis for evaluation of various policies.

First, the question of the pattern of technology transfer will be a vital component in testing the nature of Japanese behavior with regard to China. Direct Chinese military-Japanese corporate links as well as the types of technology transferred (i.e., guidance, radar, etc.) that might be particularly threatening to Japan will be examined.

Second, the force structure of Japan will be analyzed in the context of China's own military posture. Throughout this area of military analysis, publicly available data, which tends to be rather underanalyzed in this regard, will be used.

Third, economic issues are being considered. Manipulation of trade ties to create dependencies in terms of particular sectors, technologies, or investments are being investigated. Additionally, the more benevolent "mutual interdependence" line of reasoning will be evaluated.

Fourth, the U.S.-Japanese alliance seems increasingly geared toward the issue of balancing China. Evaluating this changing nature of the alliance in this regard is important in this project.

Finally, diplomatic contacts between Japan and other nations in the region and between Japan and international institutions will be examined to ascertain the degree to which these concerns are expressed in such relations.

The goal of the project is to provide substantial amounts of evidence from a wide variety of perspectives in order to evaluate the changing nature of Japanese policy toward China. In particular, evidence of the view that Japan is indeed acting as a "normal" nation and is "balancing" China will be investigated. The results of this research will be disseminated to our corporate sponsors in Program Working Papers, conference presentations, briefings, and, pending the course of this project, in other publications as well.

This undertaking, supervised by Program Director Professor Richard J. Samuels, is being supported by the Air Force Office of Scientific Research.

#### **Economic Realism and Japanese Foreign Policy During and After the Cold War**

This research project, also under the direction of Professor Samuels, is a study of Japanese foreign policy both during and after the Cold War in order to test it against theories of international relations and foreign policy. The implications of the findings of this project will be important for the Program's sponsors as they formulate business and government strategies in the coming decades. According to Professor Samuels and his research assistant Eric Heginbotham, a PhD candidate in MIT's Department of Political Science, Japan's current foreign policy is more consistent with what is described as "economic" realism than with traditional or "military" realism. Although both types of realism assume that states aim to preserve or advance their position in the international system and although mercantilist policies are not at all incompatible with the acquisition of military power, the Japanese case seems to demonstrate that some states place greater emphasis on economic security than others. Indeed, the Japanese state appears to be willing to accept short-term military risks in order to strengthen its long-term techno-economic security. The paper that is being written in conjunction with this project is being revised for publication as a chapter in a book entitled *Realism After the Cold War*, edited by Michael Mastanduno and Ethan Kapstein, with the support of the Olin Institute of Harvard University.

## **Maximizing U.S. Interests With Japan in Science and Technology**

Professor Samuels is Vice-Chairman of the Committee on Japan of the National Research Council. During the period under review, this committee has been completing a two-part policy study of how the United States might maximize its interests in interaction with Japan in science and technology. The study, funded through the National Research Council by the Departments of Energy, Commerce, State, and Defense, has two components. The findings of the first, on defense and dual-use technology, will be published in the fall of 1995. Those of the second, on competitiveness, will be published in the winter. Professor Samuels is responsible for preparing an analysis that systematically sets out U.S. interests; this analysis will be used to integrate the two studies when they are combined in early 1996.

## **Technology Supply Chains: Customer-Supplier Relationships, Make Vs. Buy, and Product Development for Process Equipment**

This project has been initiated in view of the high level of interest on the part of our corporate sponsors, who were among the 500 participants in a strategic briefing on technology supply chains held during the period under review and described below in the *Outreach* section of this report. Professor Charles H. Fine of the MIT Sloan School of Management is directing this study to investigate the development and sourcing of manufacturing technology and process equipment in three industry groups: automobiles and electronics (from the customer side), and machine tools (from the supplier side). This research project is focusing on the relationships between equipment suppliers and their customers, the make-buy decisions that firms face with respect to process equipment and technology, and the product development process for new process equipment. The goal is to create significant knowledge and expertise on how process equipment is developed and on the implications of this knowledge for policies by firms and governments.

Current Program intern, Christopher Couch, whose two-year placement is at Toyota, will return to MIT this autumn as a PhD candidate at Sloan under Professor Fine's direction and will be working with Professor Fine on this Project. Mr. Couch received his Master's Degree in Mechanical Engineering from MIT in 1993. Professor Fine is also being assisted by George Gilboy, a PhD candidate in Political Science, who is doing research on industrial supplier relations in China.

Professor Fine's research assistant is being supported by the Air Force Office of Scientific Research.

## **"Zen Learning" in Japan**

Japanese quality control is linked to the training of workers. Understanding the Japanese approach to training by method will add value to American business and manufacturing. Through its adoption of Confucian ethics, Japan has valued life-long training as an obligation of each member of society. The notion of modern education in Japan historically began in a system of local schools often centered on Buddhist temples and strongly influenced by Buddhist training. In the extracurricular lessons that each Japanese child takes, five techniques of learning are particularly evident: 1) somatic learning, which takes place by coordinating mind and body; 2) the master system, in which the master turns logic against itself in order to break through a student's fixed ideas or habits; 3) the ranking/certification system, which bestows levels of achievement; 4) *minarai*, the technique of "learning by looking"; and 5) spiral learning, in which there is constant cycling through of

material mastered and new material so that knowledge learned is exercised regularly and layered with new material. These techniques of "Zen learning" play a significant role in Japanese company training programs and have resulted in the creation of a highly trained workforce able to acquire new information and adapt rapidly to changing conditions.

This research project, undertaken during the period under review, proposes to answer the following questions: 1) what is the process that makes Japanese workers so adept at accepting change, learning new tasks, and implementing ideas rapidly? 2) how is "Zen learning" used to train Japanese children from an early age? 3) are the techniques of "Zen learning" the key to creating globally competitive workers? and 4) how are Japanese companies currently using these principles and what are the results of such training?

This project is under the direction of Dori Digenti, the Program's Director of Training, who is supported by the Air Force Office of Scientific Research. Additional funding for this project has come from the Program's corporate consortium.

### **Working Papers**

The Program's ongoing Working Paper series is a method of disseminating its research findings throughout the United States as well as overseas. These papers are distributed to the Program's corporate and government sponsors. Working papers published during the period under review are as follows:

- MITI's Successes and Failures in Controlling Japan's Technology Imports*, by Leonard H. Lynn (MITJP 94-11)
- Project Execution Capability, Organizational Know-How, and Conglomerate Corporate Growth in Late Industrialization*, by Alice H. Amsden and Takashi Hikino (MITJP 94-12)
- Multi-Project Management: Inter-Project Interdependency and Organization Coordination in New Product Development*, by Kentaro Nobeoka and Michael A. Cusumano (MITJP 94-13)
- Virtual Techno-Alliances: A Framework for Future Technology Relationships With Japanese Businesses*, by Richard L. Thurston (MITJP 95-01)
- Final Adjudication and Analysis of the Second Biannual MIT Asia-Pacific Crisis Simulation (5-7 May 1995)*, by Richard J. Samuels et al (MITJP 95-02)
- Indigenous Innovation and Industrialization: Foundations of Japanese Development and Advantage*, by William Lazonick and William Moss (MITJP 95-03)
- Exploring the Intersections of Government, Politics and the News Media in Japan: The Tsubaki Hatsugen Incident*, by Paul M. Berger (MITJP 95-04)
- Japanese Materials Science and Engineering Information on the Internet: A Case Study*, by Emi Takase and Rae Jean Wiggins (MITJP 95-05)

The Working Paper series is funded by the Program's corporate consortium. A copy of each of the above-mentioned working papers is enclosed.

### **• Outreach**

### **JPNET: Building a Global Virtual Community for Japanese Specialists**

Computer networks are transforming the way we live--the way we educate ourselves, carry out business transactions, and govern ourselves. Information service tools such as e-mail, ftp, gopher and the World Wide Web (WWW) are making it possible to provide services and information to a world-wide audience. At MIT, the Program is working closely with the Japanese Language and Culture Program and the MIT Libraries to build an information service, the first such service to provide an on-line infrastructure for an entire field, i.e., Japanese language and culture education. This service accesses library materials and other information directly from Japanese universities and other organizations. It is routinely utilized by Program interns to enrich their language ability so that they can better understand issues related to Japanese science and technology and how they relate to U.S. competitiveness vis-a-vis Japan.

Utilizing the latest technology information from Japan, we have, during the period under review, been developing and importing a series of computerized instructional materials delivered on Athena, MIT's distributed computing system, to be used outside of class by Japanese language students at MIT. Although the system has so far only been used at MIT, all the software is being written to be completely data-file driven so that it can be easily customized to a particular course and curriculum, such as an individualized technical Japanese course now in preparation by Professor Miyagawa and his associates.

MIT has recently received funding to expand the local MIT system to one that is global. This new service, JPNET (Japanese Network), will address the needs of Japanese language and culture specialists around the world. We will provide JPNET information via as many networked delivery technologies (ftp, gopher, WWW, e-mail, etc.) and in as many formats as possible to reach the widest audience we can.

During the period under review, research into Internet information delivery mechanisms and strategies, with a major focus on the World Wide Web, has been undertaken. Considerable effort has also been put into publicizing the project at various education-related conferences and symposia and contacting large numbers of colleagues in the field of Japanese language and culture. We are in the process of initiating a variety of collaborative projects with educators at other institutions. The project's World Wide Web server has been operational since February, allowing us to experiment with the various tools and services and deliver a growing body of information on Japanese language programs at universities across the country.

This project is funded by the Air Force Office of Scientific Research.

#### **Japanese Scientific and Technical Information Project**

Through this project, which is being undertaken in cooperation with the MIT Libraries, the Program is seeking to create a national resource for Japanese scientific and technical information, serving universities, industry, and government, with a focus on the practitioner rather than the scholar. The information to be gathered, such as on-line bibliographies on Japanese technology, will be made available to the Program's corporate sponsors who are in need of such data to enhance their competitive positions vis-a-vis Japan.

Effective November 1, 1994, Ms. Emi Takase was appointed to the position of Japanese Science and Technology Specialist. Following this, market research was carried out, surveying MIT Japan Program corporate sponsors, government sponsors, MIT faculty, and MIT Industrial Liaison Program companies to identify research needs and to determine the



technology area on which our databases will initially focus. This research revealed materials science and engineering to be a key technology area in which U.S. researchers seek Japanese information. This is because of Japan's strength in this field. The results of the market research as well as the needs of users were published in an MIT Japan Program working paper 94-05, as mentioned above, and were presented at the International Conference on Japanese Information in Science, Technology, Industry, and Business at the University of Newcastle upon Tyne, United Kingdom, in September 1995.

Gathering of Japanese scientific and technical information specifically on materials science and engineering started in April 1995. Resource organizations such as the Japan Information Center of Science and Technology (JICST), the Japan Society for the Promotion of Science (JSPS), and the National Center for Science Information Systems (NACSIS) were contacted. Japanese university libraries such as the library of Kanazawa Institute of Technology and Materials Science and Engineering Library of Kyoto University have also been contacted. Related sites on the Internet are being investigated and Japanese journals are being evaluated for their relevancy. Construction of the database has begun with the creation of a prototype World Wide Web homepage linked to related information resource organizations in Japan.

This project is supported by the Air Force Office of Scientific Research.

#### **The MIT Japan Science, Technology & Management Report**

This report focuses on the development and management of core technologies associated with emerging industries in Japan and the implications for the corresponding U.S. corporations and government. Each issue of the Report analyzes an emerging core technology in the light of the role of joint ventures, research consortia, trade and business associations, ministry- and agency-sponsored research activities, and private R&D linkages with the aim of providing corporate strategists and public policymakers with a critical view of the dynamic relationship in Japan between technology and the marketplace, productivity, and competitiveness. The information contained in the Report is aimed at issues of current concern to our corporate sponsors and gives our sponsors a view of Japanese industry and government cooperation and coordination.

A unique set of resources comes together in this publication. Professor Samuels is an expert on Japan's political economy and industrial technology. Research for the Report is undertaken mainly from primary source material in Japan by E. Keith Henry, who is fluent in written and spoken Japanese and who has spent many years in Japan consulting for the highest levels of Fortune 500 companies. In his research, Mr. Henry has direct access to Japanese corporate and government R&D centers, ministries and agencies, corporate strategists, and market data. Contributors include professionals with first-hand experience in such fields as management consulting, engineering, political science, and journalism, including D. Eleanor Westney of MIT's Sloan School of Management and other scholars at MIT. Supplemental analysis is made available to Report subscribers through e-mail.

During the period under review, topics covered in the Report have included Japan's environmental protection industry (the industry as an emerging competitive arena; technology to manage chlorinated organic compounds as competitive driver; technology to recycle plastics as competitive driver; and MITI's "Green Aid Plan"), Japan's micro machine industry (the industry at a time of transition and as an emerging competitive arena; basic micro machine R&D at the national laboratories; and fabrication, assembly and IC technologies as competitive drivers), and Japan's space industry (current status and outlook

for the near future; the industry as an emerging competitive arena; the development of new satellite technology with ETS-6 and COMETS; and *shingikai*-based networks for technology promotion).

The Report is funded by the Air Force Office of Scientific Research.

### **East Asia Symposium: The Regional Operations of Multinationals In East Asia**

During the past several decades, there have been dramatic increases in foreign direct investment (FDI) in East Asia, the fastest growing economic region in the world, by U.S., Japanese, and other East Asian multinationals (MNCs). As a result, by 1995:

- Hewlett-Packard Singapore has global responsibility for the design, manufacturing, and marketing of portable printers.
- Toyota is well on the way to producing an ASEAN car through manufacturing and marketing networks linked across Southeast Asia.
- CP, an agro-industrial conglomerate based in Thailand, has emerged as the largest foreign investor in China.

These several multinationals are responding to new opportunities in the form of expanded markets and innovative technologies. At the same time, they are also responding to new competitive challenges. For example, the National Science Foundation has recently reported that competition for global market share and for highly skilled professionals will increase due to the broadening technological capabilities of Asia's newly industrializing economies.

These developments prompt numerous questions regarding the foreign operations of American, Japanese, and other East Asian MNCs. For instance:

- Do American, Japanese, and other East Asian MNCs operate differently?
- Or have their strategies and structures in East Asia converged over time, across industries, and among countries?
- Are any emerging similarities and differences evident elsewhere in the triad formed by East Asia, North America, and Western Europe?

Planning for this symposium, to be held in January 1996 under the direction of Dr. Dennis Encarnation, Senior Research Associate of the Program, was undertaken during the period under review. The AFOSR has supported Dr. Encarnation's research assistant on this project.

### **Japanese Science and Technology Databases**

During the period under review, the Program has continued to make its three Japan-related databases available in order to create an ongoing dialogue with our corporate sponsors. The databases are: 1) The Japan-Aware Professionals Database, which is used to track the training, development, and career progress of the Program's interns; 2) The Japan Trip Report Database, which provides information, unique to MIT, concerning research projects being undertaken by MIT faculty in conjunction with Japanese industry; and 3) The Japan Science and Technology Experts Database, which is a listing of American scientists and engineers with expertise in what Japan is doing in specific scientific and technological areas.

The databases are funded by the Air Force Office of Scientific Research.

### Dinner Series

The Program hosts dinners during the academic year to provide an opportunity for leading Japanese and American policymakers, businesspeople, scholars, and the general public to exchange ideas and opinions on issues related to U.S.-Japan relations. During the period under review, three such dinners were held. At the first, Dr. Michael Gerlach, Associate Professor of the Haas School, University of California, Berkeley, spoke on "The Organization of Business Networks in Japan and the United States," and Ronald Dore, Adjunct Professor of Political Science at MIT, led a discussion of relevant issues. The second dinner speaker was Professor Lester Thurow, former Dean of the Sloan School of Management, whose talk was entitled "The Plate Tectonics of Capitalism." And thirdly, Professor Samuels gave a presentation on technology supply chain management in Japan to the Program's corporate and government sponsors. The last two dinners were held in conjunction with the meeting on Technology Supply Chains. The dinner series is funded by the Yaichi and Masako Ayukawa Foundation and the Program's corporate consortium.

### Technology Forum Lectures

The Technology Forum Lectures are held on campus two to three times each semester: they are free and open to the public, generally attracting a diverse group of students, academics, and businesspeople from the local area. They are made possible by the Program's corporate consortium. The Technology Forum Lectures given during the period under review are as follows:

*Research Advances in Nanocrystalline Processing in the U.S. and Japan*, by Jackie Y. Ying, Assistant Professor, Department of Chemical Engineering, MIT

*Globalization of R&D in a Japanese Company*, by Dr. Akira Fukumoto, Panasonic Technologies, Inc., Cambridge, MA

*Japanese Firms' Options and Strategies for Developing New Capabilities in*

*Biotechnology R&D*, by Steven White, PhD Candidate, Management of Technology and Innovation Group, MIT Sloan School of Management

*Explaining What Caused Changes in the Japanese Party System*, by Dr. Nobuhiro Hiwatari, Associate Professor, Institute of Social Research, University of Tokyo, and 1994-95 Associate, Program on U.S.-Japan Relations, Harvard University

*Will Japan Be China's Environmental Savior? A Critical Examination of Japan's Recent*

*Environmental Initiatives in China*, by Peter C. Evans, PhD Candidate, Department of Political Science, MIT

### Seminars

The Program also periodically hosts seminars, funded by its corporate consortium, as part of its outreach activities. During the period under review, the following seminar was held:

*Japan and the Enemies of Open Political Science*, by Dr. David Williams, Senior Research Fellow in Japanese Politics, Sheffield University, U.K.

The seminar was free and open to the public.

### Informal Talks

Occasionally, when a subject is appropriate, the Program will host an informal on-campus talk followed by a reception. During the period under review, one such talk was given, by Dr. Carol Kinney of the Department of Sociology and Social Work, University of

Michigan, and 1994-95 Associate, Program on U.S.-Japan Relations, Harvard University. Dr. Kinney's topic was "The Impact of Gender and Academic Status on Young Japanese Women's Career Choices." This talk was co-sponsored by the MIT Program in Women's Studies and was free and open to the public.

### **On-Campus Cultural Activities**

On-campus cultural activities during the period under review continued to generate a high level of interest both from the student body and the general public.

In particular, participants at the weekly Japanese Lunch Table, co-sponsored by the Program and the newly formed MIT Japanese Friendship Association, engaged in a number of special events, including viewing a video of a Japanese wedding, observing flower arrangement and tea ceremony demonstrations, learning Japanese songs, reading and discussing essays, and making Japanese masks from the *Noh* and *Bugaku* theaters. In order to facilitate discussion between the Japanese participants in the Lunch Table and the students, each week, a list of key words related to the respective activity or topic was prepared in English and Japanese.

The Program's film series during the period under review featured both contemporary and classic films by such well-known directors as Juzo Itami, Kenji Mizoguchi, and Akira Kurosawa.

During the Institute's January intersession, the Program sponsored a full schedule of cultural events, such as a *sushi* class and *sushi* party, *aikido* and tea ceremony demonstrations, a guided tour of Cambridge's "Little Tokyo," a film festival, and, in cooperation with the MIT Department of Mechanical Engineering, a showing of a video of the 1994 Japan International Birdman Competition for student-built gliders and human-powered planes.

These activities help create friendships between the Program's interns and Japanese researchers at MIT and their families. Equally important, they serve to familiarize the interns with Japanese culture before their placements and provide them with human networks to call upon once they are in Japan.

## **II. Providing U.S. citizen and permanent resident scientists, engineers, managers and students of these areas training in the Japan language and understanding of Japanese business and social culture**

### **• Education**

Education is central to the Program's activities. Program interns, who will be described in Section III below, must have at least two years of Japanese language training before they go to Japan. In order to provide that training, the Program works closely with and provides some financial support to the Japanese Language and Culture Program at MIT, which is under the direction of Professor Shigeru Miyagawa of the Department of Foreign Languages and Literatures.

The MIT Japanese-language teaching team is one of the best in the country. Professor Miyagawa has taught Japanese for more than 20 years and is regarded as one of the

world's top Japanese linguists. Other members of the team are: Assistant Professor Takako Aikawa, one of the most outstanding young Japanese linguists in the U.S.; Lecturer Tomoko Graham, an expert in the use of computer networking in Japanese instruction; Lecturer Masami Ikeda, who was one of the most sought-after young instructors of Japanese in the U.S. when MIT hired her two years ago; and Lecturer Yoshimi Nagaya, a Cornell graduate who is also considered one of the top young teachers of Japanese in this country. During the period under review, AFOSR support has allowed the Program to sponsor an increased number of Japanese language classes during the academic year and to provide supplemental tutoring for its interns.

### **Regular Academic-Year Language Classes**

During the period under review, the AFOSR has provided partial funding for two Japanese language lecturers in the Institute's Department of Foreign Languages and Literatures. This has made it possible for the Department to continue to offer three full years of Japanese. Japanese was first offered at MIT in the spring of 1988. Since that time, the Program has worked closely with the Department to develop and expand the Japanese language curriculum at the Institute. Today, with support from the AFOSR, there are 14 Japanese classes being given at MIT; seven are first-year sections, five are second-year, and two are third-year. With a total enrollment of more than 200 students, Japanese is the most commonly taught foreign language at the Institute.

### **Summer Language Classes**

Some Program interns complete the first of the two required years of Japanese language during regular academic classes and need to finish their second year during the summer to prepare for an autumn departure. For such students, the Program offers intensive second-year Japanese during the summer. This year, 15 MIT students benefited from this initiative, which was fully supported by the AFOSR.

### **Tutoring for Program Interns**

Some Program interns find that, due to scheduling and other conflicts, it is not possible for them to complete the required two years of Japanese language training in regular academic classes. Others may need supplemental tutoring outside of the classroom. In such cases, the Program provides tutoring. During the period under review, the AFOSR has supported Program interns under this initiative.

### **Curriculum Development**

In light of the need for rapid Japan-related training for corporate and government sponsors who deal with Japan on a continuing basis, the Program has created, during the period under review, a new course format called Japan Effectiveness Training (JET), which was held June 5-9, 1995. In a concentrated format of five days, JET seeks to immerse the participants in the "core values" of Japanese culture and to provide the participants with the confidence they will need in interpreting the subtexts of this well-networked society.

JET is a multi-media approach to learning about Japan. This year's JET contained three segments on Japan and East Asia, an expanded case study segment, and a "Japandy" game. It was attended by 15 participants.

## Japan Target Seminars

During the period under review, the Program gave seven Japan Target Seminars in order to disseminate its knowledge of Japanese science, culture, and business to technologically sophisticated professionals in U.S. corporate and government organizations. These seminars consist of a series of tailored modules that can be combined, according to need, for one- or two-day sessions taken on-site by Program staff or, if more convenient, given at MIT. During the 12 months covered by this report, one Target Seminar each was given at the Army Research Laboratory, AT&T, Haemonetics Corporation, Texas Instruments, 3M Corporation, Wright-Patterson Air Force Base, and Xerox Corporation, with participation of more than 200 individuals. The Japan Target Seminars are supported by the AFOSR.

## MIT Japan Program Video Series

The period under review also saw the development of the Program's Video Series, created as part of our effort to create Japan awareness at all levels of leading U.S. organizations in a way that will accommodate both time and budget constraints. The video series, originally released in November 1993, is a collection of lectures, seminars, and symposia concerning critical issues related to Japan. Ranging from successful negotiation practices to manufacturing methods, the series seeks to disseminate vital information about Japan from the Program's base of in-depth Japanese knowledge. It includes presentations by MIT faculty, Program staff, and research associates. It also contains the proceedings of several symposia sponsored by the Program and attended by knowledgeable individuals from the government, corporate, and academic sectors.

Titles added to the series during the period under review are:

- Partnering With Japan: Paths to Success* (MITJP VS #94-15)
- The Aerospace Industry: Partnering to Compete* (MITJP VS #94-16)
- The Auto Industry: Partnering to Learn* (MITJP VS #94-17)
- The Microelectronics Industry: Partnering to Globalize* (MITJP VS #94-18)
- The Organization of Business Networks in Japan and the U.S.* (MITJP VS #94-19)
- Japan and East Asia: Partners or Competitors (Parts I and II)* (MITJP VS #94-20)
- Is the World Changing Japan, And How?* (MITJP VS #94-21)
- Diffusing Lean Production: The Japanese as Reluctant Missionaries* (MITJP VS #94-22)
- How Japanese Companies Approach Product Design: The Case of Nippondenso* (MITJP VS #94-23)
- The Search for Autonomy: Japan's Indigenous Defense Production and International Collaboration* (MITJP VS #94-24)
- From Cradle to Company: The Creation of the "Shakaijin"* (MITJP VS #95-01)
- Japan Inc. in East Asia: Understanding a New Competitive Challenge* (MITJP VS #95-02)
- Japanese Politics and Bureaucracy* (MITJP VS #95-03)
- How Japanese Companies Use Information as a Strategic Asset* (MITJP VS #95-04)

The Video Series has been made possible by support from the AFOSR. During the period under review, the Program has distributed more than 340 tapes. With an estimated audience of 30 persons per tape, the tapes have been disseminated to approximately 10,000 people. A brochure describing the series and two sample videos are enclosed.

### **III. Providing program participants with opportunities to be directly involved in Japanese scientific research, engineering development, and management activities**

- ***Education***

#### **Internships**

The placement of MIT students in the fields of science, technology, and management as interns in Japanese corporate, government, and academic organization remains the primary focus of the Program's educational activities. As a new generation of Japan-aware professionals, the interns are the most valuable resource that the Program makes available to its corporate and government sponsors and indeed the nation. The Program's first interns were placed in Japan in academic 1983. Since then, this aspect of the Program has shown continued strength. During the period under review, the Program placed 52 interns.

With their training in Japanese language and culture, the interns have the authority to gain access to Japanese and scientific information as well as to the inner workings of Japanese organizations. The interns become fully integrated members of their research teams, with the same access to technical and business information as their Japanese colleagues. They routinely read research reports and memoranda in Japanese. By the end of their stay in Japan, they are usually expected to make a professional presentation or write a patent in Japanese.

During late January of this year, a two-day cross-cultural training retreat for interns planning to go to Japan during calendar 1994 was held at the MIT Endicott House, a conference facility in the southwestern suburbs of Boston. This retreat is a unique feature of how the Program prepares its interns for their stay in Japan. A major component of the retreat is the case-study approach, by which students read about the experiences of interns and business people who have gone to Japan before them. Each case ends at a point of impasse, and the group then analyzes the underlying cultural values, assumptions, and beliefs that are causing the behaviors described. Through these case studies, the interns learn about the cross-cultural experiences they can expect to encounter once in Japan. In addition to providing cross-cultural training, the retreat is an opportunity for the interns to create bonds amongst themselves that will be vitally important to them in Japan.

The interns and the intern retreat are supported by the Program's corporate consortium and the Starr Foundation. Once in Japan, the interns are supported by their Japanese host companies.

#### **Summer Internships**

Most of the interns placed by the Program are graduate students who are prepared to stay in Japan for approximately a year and, in some cases, even longer. There is, however, strong interest on the part of undergraduates at the Institute in living and working in Japan for a time. In response to this, the Program has developed a summer internship initiative, which our experience has shown is very effective for these young people. A summer internship does not break up the flow of their studies, they can get to know Japan gradually, and their adjustment process is less problematic. These internships serve as an introduction to Japanese R&D and Japanese science and technology. Since these are short-term placements, many of these interns spend several summers at different companies in Japan, giving them an expanded range of experience, effectiveness, and fluency. Many return to Japan after graduation for a year-long placement with a Japanese company.

Every effort is made to place summer interns with subsidiaries of corporate sponsors. It is our view that this opportunity for early bonding with the sponsor will facilitate later hiring. Summer interns receive a stipend from their host companies; the Program pays for their airfare. Based on the number of these interns who return to Japan for longer stays, the Program feels that summer internships are an important part of its activities. During the summer of 1995, the AFOSR supported 13 summer interns; four additional summer interns were funded by the Starr Foundation.

### Tokyo Officer

Tokyo Officer E. Keith Henry provides a critical information and support function for Program interns in Japan. Approximately one third of his responsibilities relate to intern issues, including outreach to Japanese host companies to develop new placement contacts, coordinating professional and social events for the interns, facilitating communication between the Program and the interns, and problem-solving through advice, counsel, and intercession as needed. The Tokyo Officer is fully funded by the AFOSR.

### Managing Director's Trip to Japan

As another part of the internship support initiative, the Program's Managing Director travels to Japan each spring to meet with the interns and to exchange information with them. During this trip, the Managing Director also meets with current and potential host companies to assess how their needs can best be met through intern placement. This trip is fully supported by the AFOSR.

### Technical Japanese Language Project

MIT continues to be the only institute in the world to offer intensive courses in advanced Japanese reading in targeted technical fields, i.e., computer science and electrical engineering, and materials science and related engineering (to include chemical engineering, mechanical engineering, and physics). These courses are held during an eight-week period in the summer.

During the 12 months under review, the critical work of advertising for these courses and identifying appropriate candidates was undertaken. More than 18,000 brochures were printed and mailed, press releases were sent to publications and journalists around the world, the courses were advertised on electronic mail networks and by word of mouth, and announcements were placed in academic and professional publications. This year, for the first time, extensive promotion was carried out in Japan in an attempt to reach American scientists and engineers studying or working there.

This summer, the technical Japanese language classes were held from June 12 to August 4. In total, there were 14 participants. Technical Japanese for Computer Science and Electrical Engineering had eight, and Technical Japanese for Materials Science and Related Engineering had six. Currently, more than 100 scientists and engineers have been through one of these courses.

The Technical Japanese Language Project is partially funded by the AFOSR. Some student fellowships are also provided by the Japan-United States Friendship Commission.



**IV. Providing mechanisms for participation of scientists, engineers, and managers  
from  
the Department of Defense and Department of Energy Laboratories**

- ***Education***

**Intern Recruitment**

During the period under review, the Program's government and corporate sponsors have continued to have access to interactions with Program interns. It is with the support of these sponsors that more than 350 MIT students in science, engineering, and management have been trained and placed in research settings within Japanese corporate, government, and academic organizations. The interns' areas of expertise cover a broad range, including electrical engineering, computer science, mechanical engineering, management, materials science, chemical engineering, biology, mathematics, and architecture.

These interns return to the United States with a keener knowledge of how to get things done in Japan, a set of insights about the Japanese management system and R&D approaches, and a greater sense of how people can work together in groups toward a creative gain. They return as a cadre of world-class engineers, scientists, and managers dedicated to contributing to advancement in their chosen fields and fired by the vision that this advancement rests in part on better interaction with Japan and an active pursuit of technology in the global arena. As such, the interns are the most valuable resource we can offer to our corporate and government sponsors. A partial list of intern accomplishments during the period under review is as follows:

--**Intern Y.A.** gave three presentations on his work at MIT to his colleagues in Japan. He also accompanied company officials on business trips to some of the most important cities in the air traffic control system of Japan, meeting airport personnel all the way up to the general managers.

--**Intern T.C.** gave two presentations, and participated in two seminars and in the construction of an exhibition.

--**Intern E.E.** gave 14 lectures at Waseda University, one at Kanagawa University, and one at Chuo University. He also wrote a research article entitled "Wronski Algebra Systems and Residues," which originated from a question asked at one of his Waseda lectures. Two other research articles that he wrote were presented at Waseda and Kanagawa Universities.

--**Intern R.G.** authored a paper entitled "Passive Dumping for Robust Feedback Control of Flexible Structures." He has also filed a patent for an ultrasonic wire bonding apparatus and founded the Kansai International Professionals, a business support group for professionals interested in international business.

--**Intern M.H.** gave an invited talk entitled "Mass Storage and the Internet" at Aizu-Wakamatsu University and wrote a paper entitled "Review of Progress in 3D Computer Display Technology."

--**Intern M.K.** is working with an architectural firm on a newly commissioned project to build a memorial hall in a small rural town in Shikoku. As requested, she worked with her Japanese team from the conception of the project into the preliminary design phase. She visited the site, met with the firm's clients, including the mayor of the town, and experienced

the Japanese negotiation process in architecture. The project entails not only the memorial hall, but a library and lecture hall as well.

--**Intern L.L.** co-authored a paper entitled "Estimating Future Emissions of Greenhouse-Relevant Gases." She also gave two presentations on her MIT thesis work to her Japanese colleagues.

--**Intern E.P.** was a contributor for Japan to the 1995 edition of "Going Global," a multimedia marketing report published in the United States. He is also a member of the Hypermedia Benkyokai (Study Group).

--**Intern J.P.** prepared briefing memos for MITI officials attending an intergovernmental negotiating conference and spoke several times on MITI's behalf to explain the position(s) of the Japanese government on such issues as climate change, recycling, trade and environment, and the Green Aid Plan.

--**Intern S.S.** taught a course to 10 graduate students in the engineering department at the University of Tokyo.

--**Intern D.W.** attended the Object World Expo in Tokyo and the ATM Forum's Emerging Multimedia Community Through ATM Networking Conference in Nara.

In recognition of the importance of the interns, each spring the Program distributes to its sponsors a comprehensive Resume Book of interns who are on the job market. During the period under review, the 1995 Resume Book containing the curricula vitae of 107 interns expected to be on the job market before the end of 1996, was compiled, prepared, and distributed. Our interns have been hired by such major American corporations as IBM, Motorola, Teradyne, 3M, United Technologies, and Xerox. The resume book is supported by the Program's corporate consortium.

### **Training Programs for Government and Corporate Sponsors**

In response to interest from the Program's government and corporate sponsors in studying the Japanese business and social culture, we have developed our Japan Effectiveness Training (JET) course during the period under review. A description of this is included under *Curriculum Development* in Section II above.

#### **• Research**

### **The Future of U.S.-Japan Defense Technology Collaboration**

The MIT Japan Program's two-year study of trends in U.S.-Japan defense technology collaboration indicated that there are significant obstacles to achieving greater reciprocity in bilateral defense technology transfer with Japan as well as possible new approaches that have not yet been explored. (The results of the study were released in three MIT Japan Program working papers and were written up in a number of periodicals, including the February 25, 1995 *Economist*.) The Program is following up on this initial effort with an exercise to be jointly conducted with Keidanren (The Federation of Economic Organizations--Japan's largest business organization) in 1995 and 1996. This will lead to a scenario-building project in which time lines for the evolution of bilateral defense technology relations will be prepared and related political, regulatory, and budgetary decisions will be catalogued. The data obtained through this study will be of vital importance to the Program's corporate sponsors as they

undertake strategic planning into the next century. During the period under review, work has already begun with Keidanren to prepare the scenario studies.

This project is partially funded by the Air Force Office of Scientific Research.

- *Outreach*

#### Asia Pacific Crisis Simulation Exercise

During the period under review, the Program conducted its second biannual "Asia Pacific Crisis Simulation Exercise." Forty scholars, government officials, and business leaders from Japan, China, Korea, Malaysia, Australia, and the United States gathered in Cambridge with MIT faculty and students to examine the possible future global roles for the various powers in the region. Through interactive role playing in the context of a group of fictional diplomatic, economic, and military crises in the region, the participants attempted to chart the responses of nations in the region to international and domestic events during the simulated time period from 1998 to 2009. The purpose of the game was to assess possible Japanese reactions to crises in the region in the absence of strong American leadership and/or support. This hands-on approach to political research involving the creation of crisis scenarios was facilitated by the Japan Program's extensive knowledge of Japanese politics and their relation to Asia-Pacific affairs.

Professor Samuels noted that, despite considerable domestic political instability, the Japanese team succeeded in achieving many of its long-term objectives, including a resolution of trade disputes with the United States, revision of its anti-war constitution, and reaffirmation of U.S. security guarantees. The simulation game was videotaped by Japan's TV Asahi and will be broadcast as a two-hour documentary there later this summer. The videotape, in Japanese, will be available to our corporate sponsors. The game's final adjudication and analysis has been published as a Program working paper, which has been distributed to our corporate sponsors to help them formulate strategy for the latter half of this decade and the first part of the 21st century.

The exercise was funded by the Air Force Office of Scientific Research.

#### **V. Creating mechanisms for cooperation and partnerships among U.S. industry, academia, and government to apply and employ the results of this program**

- *Education*

#### Sponsor Training Retreat

In early 1992, 10 representatives from the Program's sponsor organizations attended the intern cross-cultural training retreat described above. The interest was so strong that the Program decided to create a similar retreat aimed specifically at sponsor personnel.

During the period under review, this event was held November 16, 1994 at Endicott House. It was designed to provide an intensive 24-hour look at Japan--a nation that is fiercely competitive in the modern world and yet determined to conduct business in a

traditional framework. Thirty-nine people participated in the retreat: 13 were from government, and 16 were from industry.

The theme of this retreat was "Japan in a Global Context." Among those making presentations were Dr. Encarnation; Ms. Gercik; former MIT professor, Dr. Ronald Dore, and Program Research Associate Dr. Michael Green. Following the presentations, there was active discussion and exchange of opinions among the presenters and attendees.

Full support for this retreat was provided by the AFOSR.

## Year Three: September 30, 1995 - September 29, 1996

### INTRODUCTION

This year, the MIT Japan Program marked its 15th anniversary. When the Program was established in 1981, its founder, Professor Richard J. Samuels, now the head of the Institute's Department of Political Science, realized that, while the Japanese had long understood how important it is to learn technology from abroad, the Americans had forgotten this. "At that time," he says, "there weren't 10 Americans nationwide who could read research reports in Japanese, then walk into a Japanese laboratory, ask questions, and obtain the same kind of information their Japanese counterparts were routinely acquiring from American sources."

In order to redress this imbalance, Professor Samuels established the MIT Japan Program, with the main goal of overseeing the education of MIT students in science, engineering, and management in Japanese language and culture and placing them in internships, typically of a year's duration, in Japanese corporate, government, and academic institutions. Today, a decade and a half later, nearly 400 such young people have been placed in Japan. Many of them have subsequently been hired by the US government or one of the Program's corporate sponsors, where they are making pivotal contributions to the nation's efforts to strengthen its ties with Japan and the Pacific Rim in an era of global economic change.

In 1991, the MIT Japan Program became one of the first four United States-Japan Industry and Technology Management Training (JITMT) Centers in the country. This grant was renewed in 1993 and again in 1995. In this capacity, the Program has been an inspiration for similar initiatives at other universities around the country, including those at Stanford and Vanderbilt Universities, and the Universities of California at Berkeley, Michigan, New Mexico, Pittsburgh, Texas, Washington, and Wisconsin. Within the Institute, the Program has also been a model for the recently established MISTI (MIT International Science and Technology Initiative), which is targeting the Pacific Rim and Germany.

Today, the Program is the world's largest, most comprehensive, and most widely copied center of applied Japanese studies in the country. Situated at MIT, the Program is uniquely positioned to utilize the Institute's extensive resources on Japan and East Asia, resources that include faculty, researchers, and library collections.

This Progress Report to the Air Force Office of Scientific Research (AFOSR) covers the activities of the MIT Japan Program during the year from September 30, 1995 - September 29, 1996 under AFOSR grant F49620-93-1-0593.

Thanks to the continued generosity of the AFOSR, the Program has, during the period under review in this report, maintained its strength in each of its three core activities, namely *education*, *research*, and *outreach*. At the same time, in response to recent shifts in the global economy, the Program has expanded its mandate to position Japan as central to the dynamic growth in the Pacific Rim; this is reflected throughout the entire spectrum of the projects undertaken by the Program. In this report on our activities during the period under review, the Program is responding to the five goals set forth in the United States-Japan Industry and Management Training Call for Proposal (Special Announcement 95-3) dated February 17, 1995. Activities in each of the Program's three core activities that address these respective goals will be described in the appropriate section below.

### **I) Increasing understanding of Japanese industry and technology management methods for the creative use of science and technology**

Many of the MIT Japan's Program's activities over the past decade and a half have been undertaken with this goal specifically in mind. During the period under review, several research and outreach projects have addressed this issue. Professor Samuels' study, for example, is looking at issues of defense and dual use technology and of competitiveness to ascertain appropriate responses on the part of US government and industry. Japanese learning and corporate training strategies are the focus of another study, while the Japanese and US response, particularly by Japan-based subsidiaries of American companies, to the changing global industrial structure is being examined in a third. Many of the large number of working papers published during the past year have reflected these concerns. In our outreach activities during the period under review, we have sought to emphasize Japan's new position at the center of the rapidly growing economies of East Asia. Three meetings held during this period and described below addressed some of these issues. Additionally, the MIT Japan Science, Technology & Management Report contains up-to-the-minute information on such issues as Japan's R&D networks in Asia's emerging markets, the financial infrastructure supporting R&D in Japan, and trends in Japan's R&D investments. Our on-line databases continue to be an important source of information about science and technology in Japan and on how that science and technology is managed. Our JPNET Project seeks to make a wide range of Japan-related instructional materials available on the World Wide Web, while the Japanese Scientific and Technical Information Project is becoming a national on-line resource for the latest information on Japanese developments in the field of materials science. Technology Forum Lectures are held on campus several times each semester attended by a diverse group from both inside and outside the Institute. And finally, a full calendar of on-campus cultural activities help build friendships and understanding between our students and Japanese researchers at MIT and their families. Each of these initiatives is described below in detail.

#### **• Research**

##### **Maximizing US Interests With Japan in Science and Technology**

Professor Samuels is Vice-Chairman of the Committee on Japan of the National Research Council (NRC). This committee has been completing a two-part policy study of how the United States might maximize its interests in interaction with Japan in science and technology. This study is funded through the National Research Council by the Departments of Energy, Commerce, State, and Defense. The findings of the first part, on defense and dual use technology, was published in the fall of 1995. Those of the second, on competitiveness, will be published in 1996. Professor Samuels is responsible for preparing an analysis that systematically sets out US interests; this analysis will be used to integrate the two studies when they are combined later this year. These reports are made available by the Japan Council of the NRC (Tel. 202-334-2815).

##### **The Re-emergence of Great Power Politics in East Asia: Is Japan Balancing China?**

This project is evaluating the nature of Japanese foreign policy with regard to China. This understanding will be critical to US government and business in terms of assessing Japan's economic and political strategy for China and the Pacific Rim. The analysis will examine the nature of relations between Japan and China in a number of areas, beginning with patterns of technology transfer and the force structure of the Japanese military, i.e., the equipment and organization of Japan's armed forces as reflected by the roles and missions expected of them. It will also include economic strategies, alliance politics, and diplomatic behavior. The implications of Japanese policy toward China are quite fundamental for the future of Northeast Asia. Understanding Japanese strategy in the region as well as the implications of these strategies on the region as a whole (and on US interests in it) will be important conclusions of the project.

The goal of the project is to provide substantial amounts of evidence from a wide variety of perspectives in order to evaluate the changing nature of Japanese policy toward China. In particular, evidence of the view that Japan is indeed acting as a "normal" nation and is "balancing" China will be investigated. The results of this research will be disseminated to our corporate sponsors in Program Working Papers, conference presentations, briefings, and, pending the course of this project, in other publications as well.

This undertaking, supervised by Program Director Professor Richard J. Samuels, is being supported by the Air Force Office of Scientific Research.

#### **Manufacturing Competitiveness, Worker Skills, and Learning Strategies in the US and Japan**

This project (referred to in last year's report as "'Zen Learning' in Japan") is based on the recognition that there is a crisis in worker skills in US manufacturing companies. The skill gap between the capabilities of US workers and the complexity of manufacturing tasks, especially in such industries as automobiles and semiconductors, has widened since the 1980s, and US companies are struggling to redress this situation. Dori Digenti, the Program's Director of Training, is conducting a study of Japanese learning strategies that have been developed in traditional learning and how they support the mastery of problem-solving and analysis skills. The second phase of the study looks at how those principles apply to Japanese company training, where multiskilled, adaptable workers are developed through the same set of traditional learning strategies. The goal of the study is to offer directions and programs that US companies could consider in supporting the goal of creating successful basic skills and multiskilling training efforts. The results of this study were published as part of the MIT Japan Program Working Paper Series during the period under review.

Ms. Digenti is supported by the Air Force Office of Scientific Research. Additional funding for this project has come from the Program's corporate consortium.

#### **The Changing Role of the Japan Technology Operation: Restructuring at Home and Expanding Abroad**

This project involves a study of changes in both Japanese companies and Japanese subsidiaries of US companies in response to the changing global industrial structure. Along with Japan's transition from miracle to mature economy, the nature of competition in Japan has changed radically. The restructuring of Japanese corporate environments and the offshore movement of production are proceeding rapidly in response to the dynamism of the Asian economy. The model for Japan operations of US companies in the 1970s and 1980s was as a strategic and marketing center in the fastest growing advanced economy in the world. This model was based on a "local-for-local" organization, inwardly focused and mandated with localizing products for the Japanese market. In the 1990s, the strategic logic of locating operations in Japan has shifted, and, for some industries, the importance of Japan has declined. On the other hand, for some of those same industries, the capabilities that have been built up in Japan are being successfully leveraged into Asian businesses. This study, headed by Professor D. Eleanor Westney of the MIT Sloan School of Management and E. Keith Henry, the Program's Tokyo Officer, will include case studies of how both Fortune 500 and small and medium enterprises have dealt with the changes in global business and the influence of these changes on Japan operations. The goal of the project is to provide models of successful leveraging of Japan capabilities both in Asia and around the world.

This project is funded by the Air Force Office of Scientific Research.

### **Working Papers**

The Program's ongoing Working Paper series is a method of disseminating its research findings throughout the United States as well as overseas. Our research projects are undertaken in accordance with the needs of and in dialogue with our corporate and government sponsors. A list of papers published during the period under review, a record number of 29, can be found in Appendix 1; several of the new titles deal with issues related to China and East Asia. The papers are distributed to the Program's corporate and government sponsors; upon request, they are provided free of charge to academic individuals and organizations and are made available to the general public for a nominal fee. The Working Paper series is funded by the Program's corporate consortium.

- **Outreach**

### **Thinking About China: Lessons from Successes and Failures**

This was the first in a series of workshops at MIT, created in response to a dialogue with our sponsors to stimulate thinking about China. By combining the insights of academia with the experience of industry experts, the program took a problem-solving approach to the dilemmas faced by companies doing business in China. Some of the specific questions addressed included: 1) What can history teach us about the current political and investment climate in China? 2) Who are China's leaders and what are their goals? 3) How will China balance central control with local autonomy? 4) What can we learn from commercial successes and failures in China? 5) What does China's regulation of foreign investment reveal about China's technology strategy? 6) What are the channels (ministries, companies, universities) through which one can access China's technological capabilities? 7) How do these capabilities impact technology transfer, investment options, and personnel decisions? Presenters at this meeting included Professor Lester C. Thurow of MIT's Sloan School of Management, Dr. Terry Heng of Motorola, Professor Lucian Pye of MIT's Department of Political Science, and Dr. Richard Thurston of Texas Instruments. This meeting, held on October 24-25 at the MIT Faculty Club, was co-sponsored by The MIT International Science and Technology Initiative (MISTI) and The MIT Office of Corporate Relations Industrial Liaison Program (ILP). This meeting was funded by the Air Force Office of Scientific Research.

### **East Asia Symposium: The Regional Operations of Multinationals in East Asia**

This meeting, held January 11-12 also at the MIT Faculty Club and created in response to sponsor needs, was intended for business managers and policy analysts, as well as international and technology strategists concerned with East Asian issues. The participants learned about the networks currently being established in East Asia by multinational corporations and how they will affect investment, trade, and technology flows over the next decade. The information presented at this meeting was critical to US companies who are planning new or expanded operations in the fastest growing economic region in the world. Presenters at the meeting included Dr. Dennis Encarnation (MIT Japan Program and Harvard University), Dr. Mark Mason (Yale University), Dr. Michael Borras (Berkeley Roundtable on the International Economy), Mr. Dennis Tachiki (Sakura Research Institute), Dr. John Ravenhill (Australia National University), Mr. Yoshihide Ishiyama (IBM Japan), and Mr. Subramaniam Rangan (INSEAD and Harvard University). Many of these presentations have



been published as part of the Program's Working Paper Series. They will also be compiled for publication as a book. This Project was supported by the Air Force Office of Scientific Research.

### **The Changing Nature of the Japan Operation: Restructuring at Home and Expanding Abroad**

This workshop, held in Tokyo on February 26 with full simultaneous interpretation, explored the issues studied in the research project of the same name, described above. (It also formed the core of the agenda for the Program's sponsor retreat held in the following month, also described below.)

This program was the first to bring together the leaders of the Japan subsidiaries of the Program's corporate sponsors. We then "reported back" on the workshop to sponsors from the home offices at the sponsor retreat.

In Tokyo, special guest speaker, Professor Ikujiro Nonaka of Hitotsubashi University, co-author of the best-selling book *The Knowledge-Creating Company*, presented case studies of the knowledge spiral in the Japanese firm. Panels led by Japanese senior managers from Ford, IBM Japan, and Motorola provided insight into the challenges of managing across cultures with constrained resources. This meeting was the first in a series planned to aid Program sponsors in networking, accessing MIT research, and sharing information. The next Tokyo meeting is being planned for the spring of 1997. This project is being supported by the Air Force Office of Scientific Research.

### **The MIT Japan Science, Technology & Management Report**

Designed for the busy executive, this report presents a snapshot view of the development and management of core technologies associated with emerging industries in Japan and the implications for the corresponding US corporations and government. Each issue of the Report analyzes an emerging core technology in the light of the role of joint ventures, research consortia, trade and business associations, ministry- and agency-sponsored research activities, and private R&D linkages with the aim of providing corporate strategists and public policy makers with a critical view of the dynamic relationship in Japan between technology and the marketplace, productivity, and competitiveness. The information contained in the Report is aimed at issues of current concern to our corporate sponsors and gives our sponsors a view of Japanese industry and government cooperation and coordination.

A unique set of resources comes together in this publication. Professor Samuels is an expert on Japan's political economy and industrial technology. Research for the Report is undertaken mainly from primary source material in Japan by our Tokyo Officer E. Keith Henry, who is fluent in written and spoken Japanese and who has spent many years in Japan consulting for the highest levels of Fortune 500 companies. In his research, Mr. Henry has direct access to Japanese corporate and government R&D centers, ministries and agencies, corporate strategists, and market data. Contributors include professionals with first-hand experience in such fields as management consulting, engineering, political science, and journalism, including D. Eleanor Westney of MIT's Sloan School of Management and other scholars at MIT. Supplemental analysis is made available to Report subscribers through e-mail.

During the period under review, topics covered in the Report have included Japan's R&D networks in Asia's emerging markets, financial infrastructure supporting R&D in Japan, and trends in Japan's R&D investments.

The Report is funded by the Air Force Office of Scientific Research.

### **Japanese Science and Technology Databases**

During the period under review, the Program has continued to make its three Japan-related databases available in order to create an ongoing dialogue with our government and corporate sponsors. The databases are: 1) The Japan-Aware Professionals Database, which is used to track the training, development, and career progress of the Program's interns; 2) The Japan Trip Report Database, which provides information, unique to MIT, concerning research projects being undertaken by MIT faculty in conjunction with Japanese industry; and 3) The Japan Science and Technology Experts Database, which is a listing of American scientists and engineers with expertise in what Japan is doing in specific scientific and technological areas. These databases can be accessed through the Program's World Wide Web page (<http://www-japan.mit.edu/MITJapanProgram/>).

The databases are funded by the Air Force Office of Scientific Research.

### **JPNET: Building a Global Virtual Community at MIT for Japanese Specialists**

The Program is working closely with the Japanese Language and Culture Program and the MIT Libraries to build an information service, the first such service to provide an on-line infrastructure for an entire field, i.e., Japanese language and culture education. This service creates new, freely accessible educational materials, as well as allowing access to library materials and other information directly from Japanese universities and other organizations. It is routinely utilized by Program interns to enrich their language ability so that they can better understand issues related to Japanese science and technology and how they relate to US competitiveness vis-à-vis Japan.

Utilizing the latest technology information from Japan, we have been continuing to expand upon past development of a series of computerized instructional materials delivered on Athena, MIT's distributed computing system. Although the system has so far only been used at MIT, all the software is being written to be completely data-file driven and portable so that it can be easily customized to a particular course and curriculum, such as the new individualized Japanese course created by Professor Miyagawa and his associates.

The JPNET Project, funded by Canon Information System since October 1994, is expanding the local MIT system to one that is global. This new service will address the needs of Japanese language and culture specialists around the world. We will provide JPNET information via as many networked delivery technologies (ftp, gopher, WWW, e-mail, etc.) and in as many formats as possible to reach the widest audience we can.

During the period under review, research into Internet information delivery mechanisms and strategies, with a major focus on the World Wide Web, has continued. Our primary focus has been to migrate the various on-line educational materials once resident on the Athena system to the World Wide Web. These materials, offered now through a

consistent and easy-to-use Web interface, include reading materials, grammar notes, and practice quizzes.

The JPNET Project has also begun developing new materials which take advantage of some of the unique possibilities the Web offers as well as tools to manage its on-line information and to automate the creation process. The focus of the coming year will be to expand the Project's user-base from just the MIT campus to teachers and students at other educational institutions. Using the MIT materials as a prototype, JPNET will develop tools for the creation and management of similar materials at other sites.

This project is partially funded by the Air Force Office of Scientific Research.

### **Japanese Scientific and Technical Information Project**

This project was established after dialogue with our sponsors concerning the need to create a database of information which will be automated and user friendly. Undertaken in cooperation with the MIT Libraries, the Program is seeking to create a national resource for Japanese scientific and technical information, serving universities, industry, and government, with a focus on the practitioner rather than the scholar. After a survey of concerned academics and key personnel within corporate and government sponsors and other organizations, materials science was chosen to be the first core technology for the project. The information to be gathered, such as on-line bibliographies on Japanese technology, will be made available to the Program's corporate sponsors who are in need of such data to enhance their competitive positions vis-à-vis Japan.

The most significant achievement of the Japanese Science and Technology Information Project during the period under review was the creation of the Internet accessible database, Japanese Materials Science and Engineering Homepage, which was released to the public in December 1995. Since its publication, this database has been accessed at an average rate of about 2,000 times per month. It is accessed from all over the world, for example from Australia, the United Kingdom, Canada, Korea, Germany, and Italy, as well as the United States and Japan. US government users include the US Army Research Laboratory, the Naval Ocean Systems Center, Wright Patterson Air Force Base, Idaho National Engineering Laboratory, Oak Ridge National Laboratory, NASA Ames Research Center, and the Advanced Projects Research Agency. The database is accessed by many US companies such as AT&T, IBM, Motorola, Digital Equipment, Hewlett-Packard, Timken, United Technologies, Ford, Boeing, 3M, Aluminum Company of America, as well as US universities such as Vanderbilt, Ohio State, the University of Pennsylvania, the University of California at Berkeley, the University of Washington, Stanford University, Texas A&M, Harvard, and, of course, MIT.

Logfile statistics early this year show that the three most popular types of information accessed are publications, information on companies, and translation services, in that order. This result coincides perfectly with the findings of the market research conducted during the period covered in last year's report. Later statistics show that there has been increasing interest in the section on materials science and engineering related databases.

The database includes English-language citations and some abstracts from publications related to Japanese materials science and engineering, including several academic journals such as the Journal of the Ceramic Society of Japan, the Bulletin of the Chemical Society of Japan, the Japanese Journal of Applied Physics, and in-house company periodicals such as

Hitachi Review, Toshiba Review, and NKK Technical Report. It also includes numerous links to relevant research laboratories in Japan as well as other useful information such as directories of translators.

Information gathering and marketing of the project have been pursued aggressively. In order to gather information, 10 Japanese academic associations and 23 university and government laboratories in the field of materials science and engineering were contacted. The project announcement was made through the MIT Libraries Press Release, Industrial Collegium Report (a publication by the MIT Materials Processing Center), and JOM (a publication of the Minerals, Metals & Materials Society). In addition, the status of the project was presented at the International Conference on Japanese Information in Science, Technology, Industry, and Business held in Newcastle, UK, in September 1995 and the Fifth Annual US Department of Commerce's Technology Administration (TA) and Japan Information Center of Science as well as many other workshops and meetings. Other activities included seeking new sources of funding.

This project is supported by the Air Force Office of Scientific Research.

### Technology Forum Lectures

The Technology Forum Lectures are held on campus two to three times each semester; they are free and open to the public, generally attracting a diverse group of students, academics, and business people from the local area. They are made possible by the Program's corporate consortium. The Technology Forum Lectures given during the period under review are listed in Appendix 2.

### On-Campus Cultural Activities

On-campus cultural activities during the period under review continued to generate a high level of interest from the student body and the Japanese community at MIT as well as the general public.

In particular, participants at the weekly Japanese Lunch Table, sponsored by the Program's Japanese-American Cultural Exchange, engaged in a number of special events, including a flower arrangement demonstration, learning classical and popular Japanese songs, discussions of Japanese and American holidays, *origami*, making Japanese masks from the *Noh* and *Bugaku* theaters, and an introduction to Japanese toys.

The Program's film series during the period under review featured both contemporary and classic films by such well-known directors as Juzo Itami, Kenji Mizoguchi, Kon Ichikawa, and Akira Kurosawa.

During the Institute's January intersession, the Program sponsored a full schedule of cultural events, including a *sushi* class, *aikido* and tea ceremony demonstrations, a guided tour of Cambridge's "Little Tokyo," a film festival, and, in cooperation with the MIT Department of Mechanical Engineering, a showing of the video of the 1995 Japan International Birdman Competition for student-built gliders and human-powered planes.

Additionally, during the academic year, we have sponsored performances of *taiko* drumming and *gaku/bugaku* by the Boston-based Jo-Ha-Kyu Performance Group led by Suenobu Togi, the *gaku/bugaku* master of Meiji Shrine in Tokyo.

These activities, supported by the Program's corporate consortium, help create friendships between the Program's interns and Japanese researchers at MIT and their families. Equally important, they serve to familiarize the interns with Japanese culture before their placements and provide them with human networks to call upon once they are in Japan.

**II) Providing US citizen and permanent resident scientists, engineers, managers, and students of these areas with training in the Japanese language and an understanding of Japanese business and social culture**

Both on- and off-campus, the Program has been a leader in promoting training in the Japanese language as well as in Japanese business and social culture in the United States. In cooperation with the Institute's Japanese Language and Culture Program, for example, we have brought enrollment in Japanese language classes at MIT to record levels. We have also been instrumental in bringing world-class Japanese scholars to the Institute and in increasing the number of Japan-related courses taught by them here. A recently published interactive workbook and two CD-ROMs based on Program Managing Director Patricia Gercik's "On Track with the Japanese: A Case-by-Case Approach to Building Successful Relationships" ("The Case of Alex" and "A Core Value Approach to Strategic Negotiation" make Ms. Gercik's unique negotiation insights and skills available to a wide audience. And our highly effective video series is an important tool for the on-site education of our government and corporate sponsors about a vast array of Japan-related topics.

- **Education**

**Curriculum Development**

Our close association with the Institute's Japanese Language and Culture Program, including some faculty financial support, has helped bring enrollments in Japanese language classes at MIT to an impressive number. The language training thus provided to the interns allows these young people to create rich human networks in Japan and gives them a unique authority by which they attain a critical understanding of Japanese business R&D and manufacturing environments. Additionally, it enables them to bring their knowledge of Japanese science and technology and how that science and technology is managed to bear on issues related to US cooperation and competitiveness with Japan.

During the period under review, 13 Japanese language classes were offered at the Institute with a total enrollment of 202, more than any other foreign language. Additionally, *Introduction to Japanese Culture*, offered through the Japanese Language and Culture Program, had an enrollment of 22 students. These students actively use the Internet and computer applications developed by the Japanese language faculty at MIT to learn about the language and its relation to technology. A high percentage of the students in these classes become Program interns, which are the most important product the Program offers to its sponsoring organizations.

The Japanese language faculty at MIT, under the direction of Professor Shigeru Miyagawa, is considered to be one of the finest in the United States. Professor Miyagawa and his team are experts in computer-aided instruction and have created a technically advanced program of computerized curricular materials at MIT. These consist of on-line dictionaries and other instructional materials, including material related to technical Japanese, for delivery over JPNET (described above).

Again this summer, the Program sponsored an intensive class in second-year Japanese for five interns who were unable to complete the language requirement during the regular academic year and for five other selected students who are potential interns. The class is supported by the Air Force Office of Scientific Research. Other students who have been unable to complete the language requirement during the academic year receive tutoring that is tailored to their particular scheduling and other needs. This tutoring is supported by the Japan-United States Friendship Commission.

In addition, the Program has been instrumental in promoting the nearly 20 graduate and undergraduate courses relating to Japan that are currently offered at MIT. A list of these courses, which cover fields ranging from business and management to political economy, history, economics, and linguistics, offered during the period under review is given in Appendix 3.

#### **CD-ROM: *On Track with the Japanese: The Case of Alex***

This interactive CD-ROM teaches Japanese business practice and the four stages of trust building. Tracing the experience of an American manager assigned to work in Japan, the CD-ROM takes the learner through a series of decisions that must be made. After each series of choices, both the Japanese and Western points of view are reviewed and explained in terms of Japanese core values. In this way, the participant can learn to understand the Japanese point of view and to build trust with a Japanese work group or to prepare for a Japanese-style negotiation. This innovative tool may be used individually or in the classroom. This project was funded by the Air Force Office of Scientific Research.

#### **CD-ROM: *On Track with the Japanese: A Core Value Approach to Strategic Negotiation***

This is an interactive CD-ROM that provides an introduction to the critical implications of Japanese history and culture for current business practice. Viewers learn how today's Japan and its business practices are informed by the past. This CD-ROM uses the four stages of building trust with the Japanese to focus understanding. It teaches not only history and culture, but the use of this understanding to become effective in working or negotiating with Japanese counterparts. It includes exercises that test the viewer's understanding of Japanese business culture. This learning tool may be used individually, in the classroom, or for curriculum development. This project was funded by the Air Force Office of Scientific Research.

#### **An Interactive Workbook: *On Track with the Japanese***

This workbook includes short cases, exercises, and explanations of the four stages of building trust with the Japanese. It is based on lectures on this subject delivered to Fortune 500 companies doing business with Japan. This workbook was partially funded by the Air Force Office of Scientific Research.

#### **The MIT Japan Program Video Series**

The MIT Japan Program Video Series continues to be an important means of dissemination by which the Program can educate its corporate sponsors in the face of time and budget constraints. Currently, there are 40 titles in the series, 12 of them added during the period under review. They cover topics ranging from partnering with Japan and Japan's role in East Asia to lean production and product design. These videos are valuable to

individuals and organizations who wish to access the Program's knowledge, but are unable to attend the various workshops and symposia sponsored by us. The Video Series is supported by the Air Force Office of Scientific Research. A list of currently available video titles may be found in Appendix 4.

### **III) Providing program participants with opportunities to be directly involved in Japanese scientific research, engineering development, and management activities**

To date, the MIT Japan Program has been the acknowledged leader in placing scientists, engineers, and managers as interns in Japanese public and private institutions. Once on-site, these interns become integral parts of their work and research teams with the same access to information and the same level of involvement as their Japanese colleagues. These young people, nearly 400 of them so far, return to the United States with a high level of awareness of how science and engineering is managed within the confines of a Japanese organization and with a network of human contacts that will serve them throughout their professional careers. The Program's Technical Japanese language courses also offer unique training at an advanced level of both linguistic and technical skills. These activities and initiatives that support them are described below.

#### **• Education**

##### **Internships**

The core of Program activities is its initiative in the area of *education*, with the main focus on the placement of MIT students in science, engineering, and management as interns in Japanese organizations.

The Program's interns are the richest resource it offers to its government and corporate sponsors. With their insiders' knowledge of science and technology in Japan and the Pacific Rim and how that science and technology is managed, our interns can help the United States to enhance its competitive position in an increasingly complex global marketplace.

The Program's corporate sponsors have placed interns strategically in Asia and the United States in order to facilitate communications, to access technologies, and to create networks that will aid in the completion of major joint undertakings.

The interns are introduced to the Program's sponsors in several ways, including specially arranged meetings and through a resume book that is published and distributed three times a year. The current resume book contains the curricula vitae of interns expected to be on the job market in the near future.

During the period under review, the Program placed a total of 42 interns at such prestigious Japanese institutions as Toshiba, Bank of Tokyo, RIKEN, the University of Tokyo, and Waseda University. The summer interns included in the above number are placed at the Japanese subsidiaries of our corporate sponsors, including Nippon Motorola, Sumitomo/3M, and Trimble Navigation.

Before they go to Japan, all interns must study Japanese language and culture for two years. They are also required to attend monthly breakfast meetings and a cross-cultural training retreat held each January. A major and unique feature of the retreat is the case-study approach based on examples from *On Track With the Japanese: A Case-by-Case Approach to*

*Building Successful Relationships* by Program Managing Director Patricia Gercik. The students read about the experiences of former interns and business people in Japan and analyze the underlying cultural assumptions that inform these experiences and their outcomes. Through these exercises, the students gain direct knowledge of the kinds of issues they will have to deal with in order to gain trust once in Japan. The retreat also provides an opportunity for the interns to build networks among themselves that will serve them well as they seek to become a part of a new culture and society.

With their background, the interns are able to become integral members of their Japanese work group with the same access to information as their colleagues. Their familiarity with the Japanese language and culture greatly facilitates this process of assimilation. In Japan, the interns are also expected to attend professional meetings, make presentations, write papers, and file patents in Japanese. During the period under review, for example:

--Intern S.A. contributed an article, "Industrial Learning-by-Doing in Japanese Manufacturing Industries" to the *MIT Japan Program Science, Technology & Management Report* and gave a presentation at a PhD research meeting at the International House of Japan.

--Intern S.D. wrote three papers, "Dynamic Load Balancing in Right-Deep Pipelined Joins," "Pipeline Stage Based Dynamic Load Balancing for Right-Deep Multi-Joins," and "Dynamic Load Balancing for Right-Deep Pipelined Hash Multi-Joins for Shared Nothing Parallel Database Servers." These papers were presented at three different Japanese conferences dealing with information and database technologies.

--Intern O.S. wrote a paper entitled "Magnetic Microstructure Observations of Co-Cr-RA Films Using Neutron Scattering," which was published in *The Journal of Applied Physics*. He also made two professional presentations, "Thermodynamics in Co-Cr Magnetic Alloy Thin Films" and "Micromagnetic Domain Observation of Co-Cr-Ta Films Using Neutron Scattering," at the Magnetic Society of Japan 1995 Annual Meeting.

With their unique combination of knowledge and experience, our interns can make invaluable contributions to the nation's efforts to build better scientific and cultural relations with Japan and the Pacific Rim. As such, they are actively recruited by our corporate sponsors, many of which are undertaking important joint ventures in this area. Currently more than 50 of our interns work for our sponsors in key positions vis-à-vis Japan and East Asia.

According to Arnold Brenner, Executive Vice President and General Manager, Japan Group, Motorola, Inc.: "MIT graduates, whether they hold a Bachelor's degree or a Ph.D., have always had the 'right stuff' to be an asset to Motorola. Those students who devoted the time and energy to go through the MIT Japan Program have the extra edge of knowing what it is like to compete in business at the highest level." One such intern hired by Motorola is Richard Yeh, whose 1993-94 placement in Japan was at the Hitachi Production Laboratory. "My Japan experience helped me obtain my current job," says Mr. Yeh, "because Motorola is very interested in benchmarking, especially as related to manufacturing. Having seen how manufacturing is done in Japan is invaluable because the Japanese are so well known for their manufacturing abilities."

Recently, an alumni group, divided along regional lines, has been established to help former interns share their experiences and lend support to one another. A major focus of this



organization is expected to be a focus on Japan- and Asia-related career paths, particularly within the Program's sponsor companies.

The interns are supported by the Program's corporate consortium and the Starr Foundation. In Japan, they are funded by their respective host organizations.

### **Summer Internships**

Most of the interns placed by the Program are graduate students who are prepared to stay in Japan for up to a year and, in some cases, even longer. There is, however, considerable interest on the part of undergraduates at the Institute in living and working in Japan for a time. In response to this, the Program has developed a summer internship initiative, which our experience has shown is very effective for these young people. A summer internship does not break up the flow of their studies, they can get to know Japan gradually, and their adjustment process is less problematic. These internships serve as an introduction to Japanese R&D and Japanese science and technology. Since these are short-term placements, many of these interns spend several summers at different companies in Japan, giving them an expanded range of experience, effectiveness, and fluency. Many return to Japan after graduation for a year-long placement with a Japanese company.

Every effort is made to place summer interns with subsidiaries of corporate sponsors. It is our view that this opportunity for early bonding with the sponsor will facilitate later hiring. Summer interns receive a stipend from their host companies; the Program pays for their airfare. Based on the number of these interns who return to Japan for longer stays, the Program feels that summer internships are an important part of its activities. During the summer of 1996, the Air Force Office of Scientific Research supported 10 summer interns.

### **Tokyo Officer**

Tokyo Officer E. Keith Henry provides a critical information and support function for Program interns in Japan. During the period under review, approximately one third of his responsibilities related to intern issues, including outreach to Japanese host companies to develop new placement contacts, coordinating professional and social events for the interns, facilitating communication between the Program and the interns, and problem-solving through advice, counsel, and intercession as needed. The Tokyo Officer is fully funded by the Air Force Office of Scientific Research.

### **Managing Director's Trip to Japan**

As another part of the internship support initiative, the Program's Managing Director travels to Japan each spring to meet with the interns and to exchange information with them. During this trip, the Managing Director also meets with current and potential host companies to assess how their needs can best be met through intern placement. This trip is fully supported by the Air Force Office of Scientific Research.

### **Technical Japanese Language Project**

The Program's Technical Japanese Language Project is now in its ninth consecutive year. The course in Technical Japanese for Computer Science and Electrical Engineering has been offered every summer since 1988; the course in Materials Science and Related Engineering (to include chemical engineering, physics, and mechanical engineering) has been

given since 1992. These courses are unique because they are: 1) at an advanced level (fourth year and above) and 2) targeted at technical fields in which Japan's accomplishments have been particularly advanced. So far, approximately 120 scientists and engineers have participated in one of these courses, and, within US industry, many are making major contributions to the nation's efforts to better cooperate and compete with Japan. The Project continues to attract a high level of interest. Technical Japanese "graduates" are entered into the Program's job bank database and have been hired by Program corporate sponsors, including 3M and Xerox, where they have helped negotiate and implement groundbreaking agreements with Japanese corporations and facilitate a timely bilateral flow of information. These individuals report that they find the knowledge they have gained from the technical Japanese courses invaluable. This year, Dr. Unchul Lee, a DOD civilian from Fort Belvoir, VA, attended the course in Technical Japanese for Materials Science and Related Engineering.

This Project is supported by the Air Force Office of Scientific Research, the Yaichi and Masako Ayukawa Fund, the Japan-United States Friendship Commission, and the Starr Foundation.

#### **IV) providing mechanisms for the participation of scientists, engineers, and managers from the Department of Defense and the Department of Energy laboratories**

The Program is in constant contact with scientists, engineers, and managers from the Department of Defense, the Department of Energy, and other government sponsor organizations. During the period under review, for example, Program Director Richard J. Samuels gave a briefing on the future of US-Japan relations at the Naval War College in Newport, RI. Washington Research Associate Dr. Michael Green interacts with DOD personnel on an almost daily basis, incorporating the results of Program research into his discussions with them. DOD civilian Dr. Unchul Lee from Fort Belvoir, VA, participated in the summer 1996 course in Technical Japanese for Materials Science and Related Engineering. The Program has also designed seminars and briefings for government personnel at such installations as the Pentagon and Hanscom AFB. Tokyo Officer, E. Keith Henry routinely gives presentations at the US Embassy in Tokyo. Additionally, we send our intern resume book to our government sponsors three times each year. Lists of new video and publication titles, and notification of our conferences, workshops, symposia, and training programs are also sent to them and they are urged to take advantage of these resources. We actively encourage our government sponsors to recruit our interns with their invaluable insight and experience and to participate in programs that are of particular interest to the public sector. A list of Program initiatives of particular interest to the DOD and DOE is included in Appendix 5.

#### **• Education**

##### **Intern Recruitment**

During the period under review, the Program's government and corporate sponsors have continued to have access to interactions with the Program's interns. It is with the support of these sponsors that nearly 400 MIT students in science, engineering, and management have been trained and placed in research settings within Japanese corporate, government, and academic organizations. The interns' areas of expertise cover a broad range, including electrical engineering, computer science, mechanical engineering, management, materials science, chemical engineering, biology, mathematics, and architecture.

These interns return to the United States with a keener knowledge of how to get things done in Japan, a set of insights about the Japanese management system and R&D approaches, and a greater sense of how people can work together in groups toward a creative

goal. They return to form a cadre of world-class engineers, scientists, and managers dedicated to contributing to advancement in their chosen fields and fired by the vision that this advancement rests in part on better interaction with Japan and an active pursuit of technology in the global arena. As such, the interns are the most valuable resource we can offer to our corporate and government sponsors.

In recognition of the importance of the interns, the Program publishes and distributes a resume book, as mentioned above, three times a year.

### **Training Programs for Government and Corporate Sponsors**

In response to interest from the Program's government and corporate sponsors in studying the business and social culture of Japan and the Pacific Rim, we have developed our Executive Seminar on Japan and East Asia (formerly the Japan Effectiveness Training [JET] Course), sponsor retreat, and Japan Target seminars, all routinely attended by our government sponsors. A description of these initiatives is included under Sponsor Training Programs in Section V below.

#### **• Research**

### **The Working Group on Asian Energy and Security**

A number of factors have converged to raise concerns about energy and security in Asia, including high economic growth rates, rising oil imports from the Middle East, tensions over offshore areas believed (or known) to contain oil deposits, and growing naval forces. The Working Group on Asian Energy and Security is examining these issues from a political science perspective, considering military and defense issues as well as energy and economic policies. Seminars and working meetings are being held, and a symposium is under consideration for the 1996/97 academic year. This project is under the direction of Michael C. Lynch, Visiting Scholar at the MIT Center for International Studies.

This Group is funded by the Robert Wilhelm Fund.

#### **• Outreach**

### **Asia Pacific Crisis Simulation Exercise**

During the last period of review, the Program conducted its second biannual "Asia Pacific Crisis Simulation Exercise, under the leadership of Program Director Richard J. Samuels. Forty scholars, government officials, and business leaders from Japan, China, Korea, Malaysia, Australia, and the United States gathered in Cambridge with MIT students and faculty to examine possible future global roles for the various powers in the region. Through interactive role playing in the context of a group of fictional diplomatic, economic, and military crises in the region, the participants attempted to chart the responses of nations in the region to international and domestic events during the simulated time period from 1998 to 2009. The purpose of the game was to assess possible Japanese reactions to crises in the region in the absence of strong American leadership and/or support. This hands-on approach to political research involving the creation of crisis scenarios was facilitated by the Japan Program's extensive knowledge of Japanese politics and their relation to Asia-Pacific affairs. The game was videotaped by Japan's TV Asahi and was aired as a two-hour documentary during the period under review.

The exercise was funded by the Air Force Office of Scientific Research.

### **MIT-Keidanren Workshop on the Long-term Future of US-Japan Defense Industrial Cooperation**

This workshop, held September 12-13, 1995, is an outgrowth of the Program's two-year study of trends in US-Japan defense technology collaboration, which has indicated that, while there are significant obstacles to achieving greater reciprocity in bilateral defense technology transfer with Japan, there are also possible new approaches that have not yet been explored. The workshop was attended by government officials, corporate policy makers, and academics from Japan and the United States. Discussions centered around two possible scenarios for the future of US-Japan defense industrial cooperation. Scenario A was a continuation of the status quo; Scenario B was bold action to strengthen cooperation. Speakers included Dr. Kurt Campbell, Deputy Assistant Secretary of Defense for Asia-Pacific Affairs; Messrs. Makoto Ike and Kiyoaki Aburaki of Keidanren; Program Director Professor Richard Samuels; Dr. Michael Green of the Institute for Defense Analyses; Mr. Yoshifumi Nozawa of the Defense Production Committee; and Dr. Ken Flamm of the Brookings Institute. This workshop was funded by the Air Force Office of Scientific Research.

### **Government Participation in Program Events**

During the period under review, the following Government offices and personnel participated in events offered under the auspices of the MIT Japan Program.

**I. Target Seminars** (covering Japanese history, culture, negotiation, organization, and R&D):

The Pentagon, Office of the Undersecretary of Defense, Acquisition and Technology, October 10, 1995.

Army Materiel Command (at MIT), December 13-14, 1995

Picatinny Arsenal, June 10 and 14, 1996

### **II. Attendance at MIT Events:**

Thinking About China: Lessons from Successes and Failures, October 24-25, 1995

Dr. Roy C. Elswick, Naval Undersea Warfare Center

Mr. John Mazur, USAF, SAF-IAQ

Mr. Lester Wong, Naval Undersea Warfare Center

The Regional Operations of Multinationals in East Asia, January 11-12, 1996

Maj. Audie Hittle, USAF, Hanscom AFB

MIT Japan Program Tokyo Workshop, February 28, 1996

Dr. Julian Wu, USARO-Far East

Lt. Col. Michael Bosack, DTO, US Embassy Tokyo

Mr. Albert Magelby, Executive Office of the Ambassador, US Embassy, Tokyo

Mr. Andy Meyers, Executive Office of the Ambassador, US Embassy, Tokyo

Sponsor Retreat, March 19-20, 1996

Mr. Fred Adler, ARL

Ms. Linda Brandt, National Defense University

Mr. Norm Kreisman, DOE

Dr. Iqbal Ahmad, ARO

Lt. Tod Schwarzenbach, USAF, Hanscom AFB

**Executive Seminar on Japan and East Asia, May 23-28**

Ms. Barbara Moore, AFL

Ms. Mary Miller, OUSD, A&T

Mr. Jeff Swab, ARL

**Technical Japanese for Materials Science and Related Engineering, June 17-August 9, 1996**

Dr. Unchul Lee, DOD, Fort Belvoir, VA

### **Washington Research Associate**

**Dr. Michael Green** is a Professional Research Staff Member at the Institute for Defense Analyses and has been a research associate of the MIT Japan Program since 1990. Dr. Green has worked with Professor Samuels to produce a series of focused research seminars on US-Japan defense technology relations, which has been conducted in concert with the Defense Production Committee of Keidanren (Japan's powerful Federation of Economic Organizations) and has included detailed survey data and analysis. Throughout his frequent briefings and interactions with the DOD, Dr. Green has referred Department officials to the MIT research and Office of Secretary of Defense has incorporated the findings in policy. In addition, the National Research Council has based a significant portion of its 1995 report "Maximizing US Interests in Science and Technology Relations with Japan" on Dr. Green's and Dr. Samuel's research.

### **V) creating mechanisms for cooperation and partnerships between US industry, academia, and government to apply and employ the results of this program**

The Program has been active in creating a set of unique sponsor training initiatives in order to share its accumulated knowledge with US industry and government. These include the Executive Seminar on Japan and East Asia, which employs a multimedia approach to bring participants into direct contact with East Asian business cultures and core values, a sponsor retreat to the sponsors with cross-cultural training, the Program's Japan Target Seminars--a series of tailored modules that can be taken on-site, given at MIT, and/or teleconferenced--and our quarterly "Sponsor Update," which describes current research and products as well as upcoming events.

### **Education**

#### **Sponsor Training Programs**

Several training programs have been developed in consultation with our government and corporate sponsors. The goal is to bring the Program's and MIT's knowledge of cutting-edge research on Japanese and Asian R&D, technology, and manufacturing to bear on issues of critical importance in doing business in the Pacific region. These programs are carefully tailored to the specific needs of our sponsoring organizations.

Our highly successful Executive Seminar on Japan and East Asia (formerly the Japan Effectiveness Training [JET] Course, for example, was offered for the fifth consecutive summer on May 19-23, 1996 cosponsored with the MIT International Science and Technology Initiative (MISTI). Based on a model of "experiential learning," this course combines lecture, discussion, and case studies with CD-ROM, film, and video. The seminar's objective is to bring the participants into direct contact with East Asian business cultures and core values through business practitioners from the field, through complex case study scenarios, and through meetings with Asian professionals. From a core of common historical precedents, the participants--business and technical managers who are directly involved with

East Asian strategies and operations--learn how Japanese and Chinese business cultures developed, differentiated, and industrialized. They also look at the evolution of interactions between the two cultures as cousins, enemies, partners, and competitors. Through the seminar, participants come away with a better understanding of: 1) the cultural and business practices that inform decision-making in East Asia; 2) the dynamics of the Asian market and how they affect strategy; 3) tools to succeed by building a rapid-response team; 4) the relationship between socializing and business in East Asia; 5) how to build personal networks to help circumvent bureaucratic stalemates; 6) when to communicate their strategies and product plans to their Asian partners.

The Executive Seminar, tailored to the needs of our sponsor organizations and others in the public and private sectors, has met a variety of needs.

This year, a total 17 representatives, from our corporate and government sponsors as well from non-sponsoring organizations, attended the Executive Seminar, addressed their common needs and concerns, and came away with new understanding and strategic insights for doing business with Japan and Asia. The Executive Seminar is supported by participant tuition.

The Program's sponsor retreat was also developed in response to interest on the part of our corporate and government sponsors in receiving the same kind of cross-cultural training that is given to the interns. During the period under review, this one-and-a-half day retreat was held at MIT's Endicott House in the western suburbs in March; there were 20 attendees, 15 from industry and five from government. The retreat uses an intensive multi-disciplinary approach, including lectures, case studies, and exercises, plus time for networking. The goal is for the attendees to broaden their knowledge of Japanese and Asian institutions and develop skills for effective interaction. The theme of this year's retreat was "The Changing Role of the Japan Operation," which is described above under *Research*. A preliminary meeting, held in Tokyo in February of this year, explored issues related to this theme and identified the core material to be followed up at the sponsor retreat.

The retreat is funded by the Air Force Office of Scientific Research.

The Program's Japan Target Seminars are a series of tailored modules that can be combined for one- or two-day sessions and taken on-site, given at MIT, and/or teleconferenced. The Target Seminar topics are developed based on an ongoing dialogue with our corporate and government sponsors. During the period under review, the Program gave 12 Target Seminars with a total attendance of approximately 200 individuals. Nine Target Seminars were given to Program corporate sponsors, and three were presented to government organizations.

The Target Seminars are made possible by the Air Force Office of Scientific Research.

The Program corporate and government sponsors are kept apprised of these and other activities undertaken by the Program through our "Sponsor Update," which is published quarterly and describes our current research and products as well as upcoming events.

The Program routinely disseminates information to government sponsors through video, training materials, and working papers.

**Appendix 1: MIT Japan Program Working Papers Published During the Period  
From July 1, 1995 to June 30, 1996**

Berger, Paul M. MITJP 95-04

**Exploring the Intersection of Government, Politics and the News Media in Japan:  
The Tsubaki Hatsugen Incident**

Takase, Emi, and Rae Jean Wiggins MITJP 95-05

**Japanese Materials Science and Engineering Information on the Internet: A Case  
Study**

Collins, Steven W. MITJP 95-06

**National Institutions and Technological Innovation: A Case Study of Japanese  
Biotechnology**

Lind, Jenny MITJP 95-07

**Gambling with Globalism: Japanese Financial Flows to North Korea and the  
Sanctions Policy Option**

Encarnation, Dennis MITJP 96-01

**Does Ownership Matter? Asia and the Global Operations of Multinational  
Corporations**

Mason, Mark MITJP 96-02

**The Origins and Evolution of Japanese Direct Investment in East Asia**

Rangan, Subramanian MITJP 96-03

**Do Multinationals Shift Production in Response to Exchange Rate Changes? Do  
Their Responses Vary by Nationality?**

Sedgwick, Mitchell W. MITJP 96-04

**Does Japanese Management Travel in Asia? Managerial Technology Transfer at  
Japanese Multinationals in Thailand**

Tong, Kurt W. MITJP 96-05

**Anti-Korean Sentiment in Japan and Its Effects on Korea-Japan Trade**

Graham, Edward MITJP 96-06

**On The Relationships among Direct Investment and International Trade in the  
Manufacturing Sector: Empirical Results for the United States and Japan**

Ravenhill, John MITJP 96-07

**Japanese and US Subsidiaries in East Asia: Host Economy Effects**

Ishimaya, Yoshihide MITJP 96-08

**Is Japan Hollowing Out?**

Sako, Mari MITJP 96-09

**Suppliers' Associations in the Japanese Automobile Industry: Collective Action for Technology Diffusion**

Fine, Charles H., George Gilboy, Kenneth Oye, and Geoffrey Parker MITJP 96-10

**The Role of Proximity in Automotive Technology Supply Chain Development: An Introductory Essay**

Nobeoka, Kentaro MITJP 96-11

**Reorganizing for Multi-Project Management: Toyota's New Structure of Product Development Centers**

Lieverman, Martin, Lieven Demeester, and Ronald Rivas MITJP 96-12

**Inventory Reduction in the Japanese Automotive Sector, 1965-1991**

MacDuffie, John Paul, and Frits Pil MITJP 96-13

**Transferring Japanese Human Resource Practices: Japanese Auto Plants in Japan and the US**

Sako, Mari MITJP 96-14

**Supplier Relations in the Auto Industry: A Limited Japanese-US Convergence? Results of the 1993 IMVP Supplier Surveys**

Sako, Mari MITJP 96-15

**Restructuring and Global Strategy of the Japanese Automobile Industry and Its Perspective**

Monden, Yasuhiro MITJP 96-16

**Japan Target-Costing System of Parts Supplier Committed to the Development Phase of the Automaker**

Bensaou, M., and N. Venkatraman MITJP 96-17

**Configurations of Inter-Organizational Relationships: A Comparison Between US and Japanese Automakers**

Nishiguchi, Toshihiro MITJP 96-18

**Fairness, Rationality and Integration: Success Factors Towards a New Organizational Model**

Whitney, Daniel E. MITJP 96-19

**State of the Art in Japanese CAD Methodologies for Mechanical Products: Industrial Practice and University Research**

Shimokawa, Koichi MITJP-96-20

**Making It Work: The Real Challenge of Globalization for Japan's Automobile Industry**

Smitka, Michael J. MITJP 96-21

**The Decline of the Japanese Automobile Industry: Causes and Implications**

Heginbotham, Eric, and Richard J. Samuels MITJP 96-22

**Mercantile Realism and Japanese Foreign Policy**



Urata, Shujiro MITJP 96-23

**Japanese Foreign Direct Investment and Technology Transfer in Asia**

Borrus, Michael MITJP 96-24

**Left for Dead: Asian Production Networks and the Revival of US Economics**

Thurston, Richard L. MITJP 96-25

**Foreign Investment and Law Reform in China: A Rule of Law, Not of Man:  
Solution or Safeguard in Post-Revolutionary China?**

**Appendix 2: MIT Japan Program Technology Forum Lectures and Seminars  
August 1, 1995-July 31, 1996**

"Japan and the Enemies of Open Political Science," by Dr. David Williams, Senior Research Fellow in Japanese Politics, Sheffield University, UK, September 14, 1995.

"Will Japan Be China's Environmental Savior?--A Critical Examination of Japan's Recent Environmental Initiatives in China" by Peter C. Evans, PhD Candidate, MIT Department of Political Science, September 19, 1995.

"Japan's New Nationalism: Politics and Policy," by Chikako Ueki, PhD Candidate, MIT Department of Political Science, October 24, 1995.

"The Birth of a New Japan 50 Years after the Pacific War," by Hideki Tomizawa, Nihon Keizai Shimbun Editorial Bureau, October 16, 1995.

"The Politics of Product Liability in Japan: The Impact of Consumer Organizations on Policy-Making," by Patricia MacLachlan, 1995-96 Program on US-Japan Relations, Harvard University, February 22, 1996.

"Japan and Germany 50 Years After World War II: The Past in the Future," by Professor John W. Dower, MIT Department of History, and Professor Bernd Widdig, German Studies, MIT, March 19, 1996.

"Castration: The Main Goal of the Japanese Bureaucracy," by Dr. Masao Miyamoto, author of "The Straitjacket Society," April 10, 1996.

"Kobe Earthquake Caravan USA," by members of the Hanshin-Awaji Great Earthquake Restoration Movement, May 3, 1996.

**Appendix 3: Partial List of Japan-Related Credit Bearing Courses  
Offered at MIT During Academic 1995-96**

<u>Course</u>	<u>Title</u>	<u>Faculty</u>	<u>Academic status</u>
15.220	International Management	Guillen, Lessard, Ziegler	Graduate
15.224	Governments, Markets, and International Competition	Locke, Ziegler	Graduate
15.234J	Comparative Organization	Guillen	Graduate
17.167/8	Political Economy of Asia	Cui	Combined graduate and undergraduate
17.520	Comparative Politics of Business-Government Relations	Samuels	Graduate
17. 521	Introduction to Japan	Samuels, Gercik	Undergraduate seminar required of Program interns
17.532	Japan and the New World Order	Samuels	Graduate
17.539/40	Politics and Policy in Contemporary Japan	Samuels	Combined graduate and undergraduate
21F 514	Linguistic Theory and Japanese Language	Miyagawa	Undergraduate
21H 521	Ancient Japan and the Courtly Society	Dower	Undergraduate
21H 522	Japan in the Age of the Samurai: History and Film	Dower	Undergraduate
21H 523	Emergence of the Modern Japanese State: 1800-1955	Dower	Undergraduate
21H 524	Topics in Twentieth-Century Japanese History: Remaking Japan, 1945-52	Dower	Undergraduate
21H 536	Family, State, and Economy in East Asian History	Perdue, Staff	Undergraduate

#### **Appendix 4: MIT Japan Program Currently Available Video Series Titles**

Recent Trends in Japanese Manufacturing and Development (MITVS 93-01)  
An Overview of Science and Technology Today (MITVS 93-02)  
Political Economy of Japan: Parts I and II 2 tapes (MITVS 93-03)  
An Examination of the Historical and Cultural Antecedents of Modern Japanese Business Practices (MITVS 93-04)  
Corporate Organization in Japan (MITVS 93-05)  
Negotiating and Communicating with the Japanese (MITVS 93-06)  
The Globalization of Japanese Technology (MITVS 93-07)  
Who is the Japanese Bureaucrat? (MITVS 93-08)  
Partnering for Competitive Control: Strategic Relationships in Japan (MITVS 94-01)  
The Americanization of the Japanese Economy: Prospects and Protests (MITVS 94-02)  
The Japanization of American Manufacturing: What's Really Happened? (MITVS 94-03)  
The Internationalisation of Japanese R&D (MITVS 94-04)  
The Meltdown of Japan's Iron Triangle: Implications for the US (MITVS 94-05)  
Technology Transfer with Japan: Obstacles and Opportunities (MITVS 94-06)  
Competing Visions of Fairness in Law and Legal Norms in Japanese and US Society: Implications for Strategy (MITVS 94-07)  
Looking at the Sun (MITVS 94-08)  
Building Learning Organizations (MITVS 94-09)  
Overview of Organizational Learning in Japan (MITVS 94-10)  
Organizational Learning in the US and Japan (MITVS 94-11)  
Learning Across Organizations: Creating the New American TQM (MITVS 94-12)  
The Role of Learning in Technological Innovation (MITVS 94-13)  
The Role of Learning in Product Development (MITVS 94-14)  
Partnering With Japan: Paths to Success (MITVS 94-15)  
The Aerospace Industry: Partnering to Compete (MITVS 94-16)  
The Auto Industry: Partnering to Learn (MITVS 94-17)  
The Microelectronics Industry: Partnering to Globalize (MITVS 94-18)  
The Organization of Business Networks in Japan and the US (MITVS 94-19)  
Japan and East Asia: Partners or Competitors? Parts I and II 2 tapes (MITVS 94-20)  
Is the World Changing Japan, and How (MITVS 94-21)  
Diffusing Lean Production: The Japanese as Reluctant Missionaries (MITVS 94-22)  
How Japanese Companies Approach Product Design: The Case of Nippon Denso (MITVS 94-23)  
The Search for Autonomy: Japan's Indigenous Defense Production and International Collaboration (MITVS 94-24)  
From Cradle to Company: The Creation of the "Shakaijin" (MITVS 95-01)  
Japan Inc. in East Asia: Understanding a New Competitive Challenge (MITVS 95-02)  
The Japanese Language: What Do You Really Need to Know? (MITVS 95-03)  
Partnering with the Japanese (MITVS 95-04)  
The History of US Investment in China (MITVS 95-05)  
Central and Regional Authority in China: Implications for US Companies (MITVS 95-06)  
China in a Global Economy: Who Swallows Whom? (MITVS 95-07)  
Thinking About China: Corporate Perspectives (MITVS 95-08)

\*One tape unless otherwise noted

## **Appendix 5: MIT Japan Program Events and Initiatives of Particular Interest to the DOD and DOE**

### ***Education***

- Intern recruitment
- Technical Japanese Language Project (with the participation this summer of DOD civilian Dr. Unchul Lee)
- Training programs for government sponsors (Executive Seminar on Japan and East Asia, Sponsor Retreat, Japan Target Seminars)

### ***Research***

- Maximizing US Interests in Science and Technology (under the direction of Professor Richard J. Samuels, Vice-Chairman of the Committee on Japan of the National Research Council)
- The Working Group on Asian Energy and Security

### ***Outreach***

- Asia Pacific Crisis Simulation Exercise
- MIT-Keidanren Workshop on the Long-term Future of US-Japan Industrial Cooperation
- The MIT Japan Science, Technology & Management Report
- Briefings to DOD and other government personnel by Program Director Professor Richard J. Samuels, Washington Research Associate Dr. Michael Green, and Tokyo Officer E. Keith Henry